ENGINEERING VALUATION

OF

PUBLIC UTILITIES AND FACTORIES

BY

HORATIO A. FOSTER

MEM. AM. INST. E. E., MEM. AM. SOC. M. E.
AUTHOR OF "ELECTRICAL ENGINEERS' POCKETBOOK"
CONSULTING ENGINEER

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PREFACE

The demand for information regarding the valuation of public utilities has been growing at a rapid rate during the last few years. The reason for it is not far to seek. Many states have put their public utilities in charge of Commissions appointed or elected for the purpose, and these commissions in many cases demand valuations of the properties when permission is asked to make a change in the rates, or to add to the securities for any purpose. Many corporations are even now having careful appraisals made of their property and are as carefully keeping them up to date in anticipation of the day when the public, through the proper channels, will demand changes in rates which will necessitate such appraisals.

These conditions have brought on an urgent demand for information as to methods of valuation which, as yet, has not been available. The author has attempted to supply a part of this demand with a book almost rudimentary, in order to show how simple are the elements going to make up valuation.

The subject is too large to be treated here in more than an elementary manner, and the writer has condensed much of the theory, expanding only those elements which seem to be most needed by engineers.

After a short discussion of value, the purposes of its determination, and directions for determining it, a valuable court opinion by Judge Savage of Maine has been given in full as embodying the best instructions for valuation that the writer has yet encountered. Following this is a large number of forms developed for the purpose of making more perfect inventories, and for assembling and classifying the data in proper order. Many of these forms have been reproduced photographically, by permission, from copies of those which have been developed and used by the Joint Engineering Staff of the Wisconsin Railroad Commission and the Wisconsin Tax Commission, to the engineer of which, Professor W. D. Pence, the author wishes to express his thanks for placing these at his disposal. Others have been devised by the writer

as the result of upwards of fifteen years' experience. After a short chapter devoted to the cost of appraising a property, the value of Good Will and "Going Concern Value" are defined and discussed, and the opinions of Commissions, Courts, and individuals given at some length.

Much space is devoted to depreciation, as it is felt that engineers are more in doubt on this point than on any other question connected with valuation. Especial attention is called to methods suggested for calculating depreciation and to the compound interest tables for use in calculating sinking funds, present values, etc. This chapter is followed by one in which amortization is discussed, another on the handling of depreciation funds and a short chapter on appreciation.

Franchises are given considerable space, and a study of the court decisions quoted will, it is hoped, go far toward elucidating this very troublesome subject. Capitalization and control of public utilities are given short discussions, the whole being completed by quotations in full of some of the more important decisions of the courts, and the syllabuses of many others of only slightly less value.

No excuse is offered for the large number of quotations from court decisions and from other papers, scattered throughout the book, for it is a part of the plan, where possible, to fortify each statement with a judicial ruling. It has been the author's intention to bring together in one volume the gist of all important rulings bearing upon the subject of valuations, so that the layman may have access thereto and learn where they apply. There is a large amount of literature hidden away among the papers of the technical societies that bears directly on the subject, and a considerable amount of writing on appraisals will be found among the reports of the various commissions having control of public utilities. Abstracts from both of these sources have been used liberally. The author desires to express his acknowledgment to Mr. T. Commerford Martin for many valuable suggestions.

HORATIO A. FOSTER.

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INTRODUCTION

VALUATION OF PUBLIC UTILITIES AND FACTORIES

In recent years many of the corporations owning public utilities properties have come to financial grief, due largely to overcapitalization, to the fact that the heavy depreciation has come to a head, and to the further fact that the public has taken overcapitalization into account in making extensions of franchises. In organizing these corporations, in many cases the franchises have been capitalized as heavily as the promoters thought they would stand, and in few if any companies has an amortization fund been established to take care of the decreasing value of a franchise. It is a fact, also, that in but very few cases have steps been taken to provide for the depreciation of the physical plant that has been going on steadily and has been recognized at last as one of the very large items of expense that must be met.

Again, in but few cases have profits been as large as the original promoters had calculated, so that the franchise results have been meager indeed. In a great majority of companies, where a number of properties have been merged into one, the prices paid for the original operating properties have been very high, as the promoters of such consolidations seem to have thought that the combinations would lead to such economies as to pay good dividends on almost any amount. And again, it must be said that in many cases the original promoters expected to make their profits on the manipulation of the securities rather than upon any earnings that might accrue to the new corporation. For these and other reasons many of the public utilities corporations have been so heavily loaded with so-called watered stock, and many of them with watered bonds, that the anticipated earnings have not been enough to pay the interest on the bonds, to say nothing of paying dividends on the stock. In some cases, however, dividends were paid for a while after the organization, as the earnings were quite large and depreciation had not been enough to become troublesome. In no

case of public utilities known to the writer had provision originally been made to cover depreciation.

As the physical property has worn out, or for economic reasons has had to be replaced by newer forms of apparatus, expenses have increased to such an extent that the earnings have seldom been enough to meet the extra requirements, and the necessary new capital has been secured through reorganization. In such reorganizations bankers have taken securities at a very considerable discount, demanding also a large bonus of stock. These reorganizations have continued until the present time, but the people begin to look upon the value of such securities with considerable doubt, and, to protect themselves, have, in many states, pressed the matter of public utilities commissions in their respective legislatures, resulting in the establishment of new commissions or the enlargement of the powers of the already existing railroad commissions to cover the new demand.

In the majority of cases, the new powers conferred upon these commissions give them control of the issue of all bonds and stocks by the public utilities, and, before allowing an issue of any kind of securities, demands are made for appraisals of the physical property of the corporations.

In Massachusetts the law demands that the Commission shall determine if the fair physical value of the property owned equals or exceeds the existing securities. Such fair value means in all cases a present or depreciated value, and no issue of new securities is allowed unless the value of the physical property equals or exceeds that of the par value of the existing securities. Even when the value of the property exceeds the par value of securities, new issues are only allowed to be sold at the then existing market price, which in that particular commonwealth is nearly always above par. It is, therefore, practically impossible to get any so-called water into securities that are issued by a public utilities company existing under Massachusetts laws.

In some rare instances public utilities corporations have been reorganized and carried along until the growth of business has saved the day, and, by conservative management, a paying basis has been reached.

In many cases, however, receiverships have been found necessary, and reorganization under a receiver with a public utilities commission to control the issue of securities has resulted in drastic reductions of watered stock and the placing of securities on a rock

bottom basis, governed largely by the physical value of the property owned.[1] Curiously enough, the value of franchises has been given little consideration except in such notable cases as that of the Consolidated Gas Company of New York, and the Chicago Railway settlement, in which, by a compromise, a certain arbitrary amount was allowed for the remaining life of the various franchises.

At the present time the "indeterminate" franchise is being given more serious consideration than any other form, and, as it has been in use in the state of Massachusetts ever since public utilities corporations have existed there, and with no trouble whatsoever, and as probably more street railways and lighting companies have been incorporated there in proportion to the number of inhabitants than in any other state, it would seem that there is little trouble to be expected with this particular form of franchise. It may be well to explain that in effect the indeterminate franchise is simply a permit to operate during good behavior, and it will be treated more fully later on in the chapter on franchise.

In many instances public utilities have been developed along expensive lines, as, for instance, the modern street railway, which first consisted of horse-propelled vehicles traveling on a light strap rail laid on wooden stringers; next a cable railway with a very expensive under-the-surface construction, and lastly the electric railway, which has necessitated the changing of all the old types of equipment. Rails have been replaced time and again as the cars have been increased in size and weight; power houses have been built and rebuilt to meet the ever increasing demand for power, and all these development expenses have been met by adjustment of capital resulting in the issue of additional securities, and in few cases known to the writer have any attempts been made to amortize such development expenses.

Now when reorganizations are found to be necessary and the commissions demand appraisals of the physical property as a basis, it naturally results in a corresponding reduction of capital if all evidence of development items has disappeared.

It has been a puzzle, then, to determine some equitable method of reorganization that would be fair and agreeable to the corporation and acceptable to the commissions, but this seems to have

[1] In the case of the Third Avenue Railway *v.* Public Service Commission of N.Y., Second District, the courts decided (Nov., 1911) that a public utility corporation could reorganize without reference to the Public Service Commission, if it did not issue new securities in excess of those already outstanding.

been very cleverly met by a method of applying a physical valuation of the property of the International Traction Co. of Buffalo by Bion J. Arnold.

This property is one of the large systems which has lines in one large city and in a number of smaller ones, and has many miles of suburban and interurban railway. It has been built up on a foundation of a comparatively small horse railway, but it has been very largely extended since that time and the development expenses include only those incident to the rebuilt power plants, replacing old cars with new and larger ones, and such other items as have been due to changes in the art. In the appraisal no attention has been paid to the value of any franchises nor to the amount of the capital stock or securities that have been issued.

First, an appraisal was made giving the cost of reproducing new all the physical property as of to-day and in its existing form. No present or depreciated value was computed, the plain cost to reproduce new being considered sufficient so far as value of existing property was concerned for the purpose of this reorganization. This cost to reproduce new the property at this or any given date is considered the basis of value to which the capitalization should eventually be brought, although to cover early losses, obsolescence, brokerage, discounts and development expenses, a higher capitalization is temporarily allowed, and for this purpose it is proposed to divide the gross earnings in the future as follows:

a. Operating expenses, including taxes, insurance and maintenance.

b. Depreciation fund, sufficient to always maintain the properties in first-class operating condition.

c. Interest on all money put into the property as represented by bonds, and on all actual cash put into the property from other sources.

d. All surplus to be devoted to amortization of the excess capitalization represented by the above-mentioned early losses, obsolescence, brokerage, discounts, and development expenses, either by the purchasing of the securities which represent these items, or by the building of extensions to the property from this surplus and thus without increasing the capitalization, until the value of the securities issued becomes the same as that of the physical property which is performing the service, after which time the surplus can be divided between the public and the company, in some such a manner as is done in Chicago, used for the reduc-

tion of fares to the public, or otherwise as may be agreed between the regulating bodies representing the public and the company performing the service.

Such a method will place the capitalization of the corporation on a basis so solid that a commission can safely allow the issue of securities for the purchase of additional plant, track, cars, and anything else for which money may be needed. The method will also gradually amortize out of existence any capitalization that may have been issued for franchises, good will, or development expense. It takes care of all depreciation so that the value of the property is maintained intact, and, in fact, seems to cover in a very equitable manner all points heretofore left unprovided for in such reorganizations.

CHAPTER I

VALUE

Webster's Dictionary gives the following definition of value:

"Worth estimated by any standard of purchasing power, especially by the market price, or the amount of money agreed upon as an equivalent to the utility and cost of anything."

A shorter definition by F. A. Walker is:

"Value is the generic term which expresses power in exchange."

Professor H. C. Adams says:

"One cannot go far in the consideration of the process of valuation, however, without being forced to recognize that value is a highly complex idea, and that the process of valuation is in a marked degree an analytical process, and, further, the necessity of formulating definitions, and of presenting the aggregate valuation arrived at under appropriate heads, will result in a new point of view, from which the problem of the relation of public service industries to the political organization may be regarded."

The above definitions cover the term "value" in a general sense, but the subject broadens and is divided into various kinds of values, viz.:

Market value, which may be defined as the amount that may be agreed upon as between a willing buyer and a willing seller.

In a recent lawsuit, the following definition of market value was given to the witnesses by the court:

"Market value means the fair value of the property, as between one who wants to purchase and one who wants to sell any article; not what could be obtained for it under peculiar circumstances, when a greater than its fair price could be obtained; not its speculative value; not a value obtained from the necessities of another. Nor, on the other hand, is it to be limited to that price which the property would bring when forced off at auction, under the hammer. It is what it would bring at a fair public sale, when one party wanted to sell and the other to buy."

Taxable value, or the value placed upon property of a taxable nature by the assessor.

Commercial value, which perhaps may be considered the same as market value, is defined by the Century Dictionary as "that for which a thing can be sold or exchanged at a given time or place."

Professor Adams defines it as "the estimate placed upon the worth of a property, regarded as a business proposition."

One of the best definitions yet seen by the writer is that of Henry Earle Riggs, in a paper read before the American Society of Civil Engineers in January, 1911, entitled "The Valuation of Public Service Corporation Property." He says:

> "As a definition of that estimate of worth which an engineering commission should report as the result of a complete appraisal, the following is submitted: The value of a property is its estimated worth at a given time, measured in money, taking into account all the elements which add to its usefulness or desirability as a business or profit-earning proposition."

Matheson says:

> "The value of anything is sometimes defined as that which it will fetch; and in the sale of a factory, the price at any particular time will, if there be freedom on both sides, depend not on the original cost or on any arbitrary standard of value — although of course the cost at which a similar factory could be built and equipped is an important consideration — but on the competition either of buyers or sellers; in other words, on the supply or demand. The element of freedom is wanting in a compulsory purchase there, the basis of price is the value to the seller, who is compensated for what he loses, and not for what the buyer gains."

Earning Value is the value placed upon or agreed upon for a property, based on the earning capacity of that property, either from the known past earnings or from those estimated for the future. Again quoting from Matheson:

> "The real basis of value, however, which generally guides a purchaser, is the estimated earning power, or the net revenue, past, present, and prospective, so far as it can be ascertained. From this point of view there is often more scope for difference of opinion than would at first sight appear. The rate of profit in the past is a primary basis, but this is not conclusive. A purchaser may see his way to improved methods, to an extended trade, to a better utilization of the plant or site, and so to greater profits. On the other hand, past profits may

have been due to special knowledge of the proprietors; much may really have been owing to skilled management, which, if obtainable at all in the future, may require the payment of considerable salaries taking precedence of profits, or the payment of directors' fees. Private partners may not have debited the concern with salaries, but, if they are selling the concern to a company, may claim them when they serve as managers or directors."

In the case of Cotting *v.* Kansas City Stockyards Co., and in Monongahela Navigation Co. *v.* United States, the court had the following to say as regards basing the value of a public utilities property on the earning capacity:

"When a valuation is placed on property which has become affected with a public use, for the purpose of ascertaining whether the maximum rate of compensation fixed by law for its use is reasonable or otherwise, it is obvious that the income derived therefrom by the owner before it was subjected to legislative control cannot always be accepted as a proper test of value because the compensation which the owner charged for its use may have been excessive and unreasonable. Again, when property has been capitalized by issuing stock, neither the market value nor the par value of the stock can be accepted in all cases as a proper criterion of value, because the stock may not represent the money actually invested, and, furthermore, because the property may have been capitalized mainly with reference to its income producing capacity, on the assumption that it is ordinary private property, which the owner may use as he thinks proper, without being subject to legislative control. On the other hand, however, when property is valued for the purpose last stated, it is clear that the owner thereof is entitled to the benefit of any appreciation in value above the original cost and the cost of improvements, which is due to what may be termed natural causes. If improvements made in the vicinity of the property, the growth of the city or town where it is located, the building of railroads, the development of the surrounding country, and other like causes, give property an increased value, the owner cannot be deprived of such increase by legislative action which prevents him from realizing an income commensurate with the enhanced value of his property." (82 Fed. Rep. 854.)

"The value of property, generally speaking, is determined by its productiveness, — the profits which its use brings to the owner. Various elements enter into this matter of value. . . . Neighborhood to the centers of business and population largely affect values, for that property which is near the center of a large city may command high rent, while property of the same character, remote therefrom, is wanted by but

few, and commands but a small rental. Demand for the use is another factor. The commerce on the Monongahela River, as appears from the testimony offered, is great; the demand for the use of this lock and dam constant. A precisely similar property, in a stream where commerce is light, would naturally be of less value, for the demand for the use would be less. The value, therefore, is not determined by the mere cost of construction, but more by what the completed structure brings in the way of earnings to its owner. For each separate use of one's property by others the owner is entitled to a reasonable compensation, and the number and amount of such uses determines the productiveness and the earnings of the property, and, therefore, largely its value. So that, if this property, belonging to the Monongahela Company is rightfully where it is, the company may justly demand from every one making use of it a compensation; and to take that property from it deprives it of the aggregate amount of such compensation, which otherwise it would continue to receive. What amount of compensation for each separate use of any particular property may be charged is sometimes fixed by the statute which gives authority for the creation of the property; sometimes determined by what it is reasonably worth; and sometimes, if it is purely private property, devoted only to private uses, the matter rests arbitrarily with the will of the owner. In this case, it being property devoted to a public use, the amount of compensation was subject to the determination of the state of Pennsylvania, the state which authorized the creation of the property. The prices which may be exacted under this legislative grant of authority are the tolls, and these tolls, in the nature of the case, must enter into and largely determine the matter of value." (Monongahela Navigation Co. *v.* United States, 13 Sup. C. 627.)

Division of Values. — Value in general may be considered under the following heads, viz.:

Physical Value.	Original cost.
	Reproduction value now.
	Overhead charges.
	Scrap or salvage value.
	Wearing value.
	Service value.
	Present or depreciated value.
Intangible Value.	Development expenses.
	Franchise value.
	Going concern value.
	Good will value.

Physical Value is that value which includes the costs of constructing a property, together with the value of all material, apparatus and the labor of installation. Physical value should include also all nonphysical charges that are closely connected with the construction and installation of the property, *i.e.* engineers and architects' charges, including all designing and testing: administration expenses, which include superintendents, inspectors, clerk hire, legal expense, rent, storeroom expenses, etc., taxes and insurance during construction.

In appraising the physical value of a property allowance must also be made to provide for contingencies, incidentals, incomplete inventories, etc.

Worth may be defined as the physical value of a property or article less the depreciation, and, while not necessarily the value of the property, it is clear that the physical worth must be determined in order to learn the value. The investment upon which a return is to be earned is represented by the physical value of the property for which the money invested has been expended.

Property owned by private persons may be used as the owner may see fit. So also may property be handled that may belong to a company or a limited liability partnership that is not engaged in serving the public needs. But corporations which are organized for supplying the public with any of its public utilities, such as gas, domestic water supply, transportation, telephones, and electric lighting, are now, by decisions of the Supreme Court, subject to regulation by the properly constituted authorities as to rates to be charged for service, methods to be used, character of service given, compulsory supply, and rate of dividend. They are no longer allowed to overcapitalize as in the past, nor are they permitted to pay excessive salaries or other compensation to officials and directors, and they are required, on proper notice, to furnish complete, detailed appraisals of their entire property so that rates may be determined in an equitable manner.

A corporation owes its existence to the state and therefore owes a duty to that state from which it obtained its charter. It should furnish all reports of its operation freely and willingly under proper safeguards by the state; but there are many corporations given life and existence which are quite averse to furnishing such reports to any one but the bureau of corporations for tax purposes, and in many cases these reports are apparently so juggled as to render them of little use in determining the result of operations.

This condition obtains whether the corporation is very profitable or is making no net income. The only remedy suggested for relieving the profitable corporation is that it should withdraw from the protection of the state and become a simple partnership. For some unknown reason this is seldom done.

In appraising the property of a public utilities corporation care should always be taken that the figures of valuation are based upon a simple engineering calculation, original cost, or cost of the property reproduced new. There is always danger that an appraisement may be biased in favor of the parties for whom it is made. Appraisers are sometimes requested to favor the parties by whom they are employed, as, when appraising for a corporation, if the valuation is for rate-making purposes, to make the appraisement high, or if for taxation, to produce a lower figure, and again, if for sale, the desire will be wholly to make the value as high as possible. There can be no doubt, however, that there is but one legitimate value, which is such as may be determined by competent engineers at the given date and under the conditions existing. This matter has been very well stated by Henry Earle Riggs in a paper on "The Valuation of Public Utilities Companies Property," read before the American Society of Civil Engineers, November, 1910 (page 1499, Trans. Am. So. C. E.):

> "It is further contended that, in making the physical appraisal, the purpose of the appraisal should not be permitted to modify the figures. The resultant figure should be the same, whether it is to be used as a basis for assessment, rate making, or limitation of capitalization. It should be an engineering estimate of the amount of bona fide capital still remaining in the property, or of the complete cost of reproduction under existing conditions, less depreciation. This figure is definite, within reasonable limits, and it cannot be conceded that it is permissible to vary it, submitting one result as a physical value for taxation, and another and different result as a present physical valuation for rate making."

Present, or *depreciated*, value must be determined by making a proper deduction from the cost to reproduce a plant new, or from the cost of the plant upon whatever basis it may be appraised.

There has been some controversy over the question as to whether properties should be valued on the basis of reproduction new in the same form as at the date of the appraisal, or should be rated at the value of a new plant of the same capacity, but up-to-date in every respect. Many take the ground that the valuation of

an existing plant need not be based upon the reproduction as found, but may be based upon the cost of a new plant substituted for the old, for doing the same work, but in the most modern manner. It has been decided by the courts, however, that in making an appraisal of public utilities properties the valuation must be taken as of the property in the same form which it exists at the time of the appraisal. See opinion of Judge Savage in Kennebec Water District *v.* City of Waterville (54 Atl. Rep. 13) following:

> "The court, in San Diego Water Co. *v.* San Diego, 118 Cal. 556, 50 Pac. 633, 62 Am. St. Rep. 261, 38 L. R. A. 460, holds that the method of fixing present value by ascertaining cost of replacement is not applicable to property of this character, because, chiefly, the construction and development of waterworks is a matter of growth. At the outset the company owning them is a pioneer. It must keep pace with or anticipate municipal growth. The works must be constructed, and usually no reward can be realized by the constructors until some time has elapsed. In the meantime, as the city grows, the facilities of building such works are increased, and the cost of construction thereby diminished. But we think that, at the most, these considerations suggest only that other elements are also taken into account in fixing present value. So far as they relate to the original hazard, we have discussed them in an earlier part of this opinion. We think the inquiry along the line of reproduction should, however, be limited to the replacing of the present system by one substantially like it. To enter upon a comparison of the merits of different systems — to compare this one with more modern systems — would be to open a wide door to speculative inquiry, and lead to discussions not germane to the subject. It is this system that is to be appraised, in its present condition and with its present efficiency."

W. H. Williams, 3d Vice President of the Delaware and Hudson Canal Co., in the *Railroad Age Gazette* of April 9, 1909, has the following to say upon this part of the subject:

> "Ordinarily we should expect to see the valuation for taxation much less than the valuation used as the basis for making rates, or for capitalization. Generally speaking, the valuation of property for taxation should be its market value, regardless of the purpose for which it is used. Capitalization should represent the cost of the property to the present holders thereof. The valuation for rates is dependent, among other things, both upon the first cost and the present value as a 'going concern.'"

Original Cost. — In making valuations little attention has been paid in the past to the original cost of plants, for the reason that

it has been very difficult of determination. Many corporations for which valuations are made to-day are the result of combinations, and these combinations have been made almost invariably upon the earning value rather than upon the physical worth. It is a natural consequence that little attention has been paid to the construction or first cost of these plants, and therefore records of cost are seldom available to new buyers.

H. P. Gillette says, in his report on the valuation of the railroads in the state of Washington, that he considered the original cost of so much consequence that he insisted on having the records produced, and after he had secured much of the original data by other means, and after a delay of months, the railroads reluctantly—at first—gave up the records. Mr. Gillette feels that persistence in such a demand will nearly always disclose the original costs.

Again, where such records have been kept, there is no assurance that they are correct from the standpoint of cost, as in many cases the figures have been raised in order to cover the issue of the bonds and stock. This has been done in many cases in New York State, especially with street railways, and the books generally read "cost of railway by contract." Such contracts have been made at a price equal to the total issue of securities, where it is a well-known fact that the bonds have been issued in payment for the physical property, and usually issued at a discount, and the stock has been issued for franchises or given as a bonus. For such reasons it has been particularly difficult to determine the first cost.

In certain waterworks cases it has been possible to determine the first cost, and particular effort has been made to learn this, for the reason that in some court cases the reasonable return to be allowed to the owner of such works has been calculated upon the original cost.

Items are frequently included in original cost that have been discarded, superseded, or abandoned for obsolescence or other good and sufficient reasons. Ten years back the capitalization of these items was not often disturbed, the value of the new article displacing the old being added directly to the capital in many instances. Since that time, however, much greater care has been exercised, and now only the excess value is added, or the value of the old material has to be depreciated gradually in order to get it off the books. Most accountants try to have this removed at once, but in the case of street railways where a whole cable system,

for instance, has been abandoned it would be very harmful to the owner and impracticable to write the total value off the books at once, and engineers now feel that such items should be depreciated at the regular rates or perhaps at a little higher rate than usual until entirely canceled.

Reproduction Cost New. — The reproduction cost new is the basis upon which substantially all modern appraisements are made. It is the most fair, from the fact that it is based upon existing conditions, and it is not especially difficult to determine market prices for materials and labor at the time. Reproduction value should include, besides the value of the actual physical property, its value as a going concern, the value of good will, the value of its franchise, if operated under such a privilege, and its earning value.

> "18. The appraisers may properly consider what the existing system can be reproduced for. But the cost of reproduction will not be conclusive. It will be evidence having some tendency to prove present value. The inquiry along the line of reproduction should be limited to the replacing of the present system by one substantially like it." (Kennebec Water District *v.* City of Waterville, *et al.*, Sup. Jud. Ct. of Maine, Dec. 27, 1902.)

The prices to be used in connection with the reproduction cost must depend somewhat upon the judgment of the appraiser, and, if convenient, to arrive at an agreement with the opposite party, when two or more are interested, such agreement will go far in settlement. In some of the large cases with which the writer has been associated, prices for nearly all common materials were taken at the date of the appraisement, but when large quantities of some special materials have been found, as for instance, copper, iron, steel rails, cast iron pipe, steel or wooden poles, cross-arms, etc., prices have been averaged for four or five years previous to the date of the appraisal.

In Willcox *v.* Consolidated Gas Co. (29 Sup. Ct. 200) the court stated that the price as of the date of the appraisal was the correct one to use.

Two opinions delivered by Judge Savage in advance of decisions regarding the appraisal of three water companies in the state of Maine, take the ground that the price must be taken as the average over a period of time necessary to complete the works previous to the date of taking over. That is, if it was estimated by the appraisers that it would take three years to build the structures,

then the average price for that three years ending upon the date of taking over the property would be the price at which the valuation should be made. On the contrary, in the case of the National Water Works Company *v.* Kansas City, 62 Federal Report 853, the court decided that the price obtained at the date of delivering the works would be used in the appraisal. Following is the language of Judge Savage in one of the Maine opinions:

> "In determining, not cost, but present value, present prices, of course, are the standard, rather than former prices. It is suggested that in fixing the value on January 1, 1904, allowance must be made for the fact that a plant ready to be delivered on a given date must have been commenced a considerable time before, certainly. When we say 'present prices' we mean prices within a period necessary for construction. And a fair rate — usually the prevailing rate — of interest upon the money invested in the plant during construction, and before completion, is as much a part of the cost of construction, as is the money itself which is expended for materials and labor." (59 Atl. Rep. 542.)

> "And we concur with the court below in holding that the value of the property is to be determined as of the time when the inquiry is made regarding the rates. If the property which legally enters into the consideration of the question of rates has increased in value since it was acquired, the company is entitled to the benefit of such increase. That is, at any rate, the general rule. We do not say there may not possibly be an exception to it where the property may have increased so enormously as to render a rate permitting a reasonable return upon such increased value unjust to the public." (Willcox *v.* Consolidated Gas Co. 29 Sup. Ct. 200.)

> "We hold, however, that the basis of all calculations as to the reasonableness of rates to be charged by a corporation maintaining a highway under legislative sanction must be the fair value of the property being used by it for the convenience of the public. And, in order to ascertain that value, the original cost of construction, the amount expended in permanent improvements, the amount and market value of its bonds and stock, the present as compared with the original cost of construction, the probable earning capacity of the property under particular rates prescribed by statute, and the sum required to meet operating expenses, are all matters for consideration, and are to be given such weight as may be just and right in each case. We do not say that there may not be other matters to be regarded in estimating the value of the property. What the company is entitled to ask is a fair return upon the value of that which it employs for the public convenience. On the other hand, what the public is entitled to demand is that no more be

exacted from it for the use of a public highway than the services rendered by it are reasonably worth." (Smythe *v.* Ames. 18 Sup. Ct. 434.)

John W. Alvord, in a paper read before the American Water Works Association in June, 1909, very clearly states the conditions necessary to take into account in valuing a going plant for reproduction cost, as follows:

1. "In estimating the cost of reproducing a plant, it is obviously important to consider the reproduction as taking place in a way that is *humanly possible.* Now, it is not humanly possible to construct a plant in the past, or in one day, or by the substitution of hindsight for foresight; therefore, if we are to avoid flights of constructive fancy, we are compelled to consider the reproduction as taking place in the near future in reasonable and workable periods of time, and without special foreknowledge other than that gained from experience with similar construction and familiarity with costs in the near past. To do other than this will not be 'reproducing.'

2. "A conceptual starting plant which is in process of being estimated must be made to pass through all the preliminary phases of mental origination as well as physical construction; it must consider the time and cost necessary to devise, conceive, design, negotiate, administer and direct, as well as the labor cost of digging and building, and the duplication which we try to imagine involves the recreation of many subordinate structures, appliances, and much machinery which will have been removed or will have ceased to exist, but which were necessary in their time and place in order to bring about that finished condition which finally appears.

3. "The conceptual starting plant must of course finally precisely accord in form, dimension and extent with the existing or going plant under consideration; in other words, the estimator has before him full-sized and lifelike plans and specifications furnished by the existing or going plant. This very completeness of data often tempts even experienced estimators into a neglect of the intermediate steps by which such plants are originally evolved.

4. "The conceptual or starting plant should, as a matter of fairness, deal with all difficulties known to be originally encountered in constructing the existing or going plant, notwithstanding such difficulties might now be easily modified or eliminated by a forewarned intelligence.

5. "The value of the conceptual or starting plant should be computed upon such prices of labor and material as it would seem safe for a prudent man to commit himself to and for such reasonable period in the near future, as experience shows will properly be required for construction. Such period in any new construction cannot of necessity be contemplated as completed in the near past from the date of the

estimate, for to consider such prices as of a period that has already passed would be taking advantage of knowledge not humanly available to the ordinary constructor. Prices in the near future, however, should of course be predicated (with good judgment) upon those of the near past, just as in any practical case of new construction."

* * * * * * *

7. "The method of valuing at some present date by the reproduction theory will necessarily include all the appreciations in value which logically and properly ought to be credited to the existing or going plant, by reason of its age. Some of these appreciations are readily admitted, as, for instance, '*Increased Value of Land*' due to a city's growth, but other items quite as logical are sometimes unexpected, as, for instance, the increased cost that will be *necessitated in relaying pipe under pavements*.

8. "If appreciations are thus made necessary in the process of duplication, it is also true that on the completion of the conceptual starting plant it must be reduced in value by the measure in which the existing or going plant has depreciated through age, wear and tear, by reason of new inventions, changes in demand, growth of ideas and other fluctuating conditions. The time element here is of vital importance."

Overhead Charges. — These charges are certain percentages added to the cost to reproduce new, in order to complete that valuation. They are made up of a number of items, some of which are nearly always in dispute, but are finally and in general agreed upon by engineers and appraisers.

It must be understood that the percentage for general contractors' profit, being at the rate of 8 to 15 per cent, should be added to the cost as developed from subcontractors' prices, and is not a legitimate overhead charge. The sum of the cost to reproduce new, plus the general contractor's profit, is the true cost to reproduce. It is a general condition to-day that most large or heavy construction is in the hands of a general contractor, who, for a certain percentage, looks after all subcontractors and all of the construction in general. This, of course, does not apply to items of equipment, such as rolling stock for a railroad, or the connections for a gas or electric light company, etc. Where a property is being extended and the construction is in charge of the regular engineers employed by the company, no charge is necessary for the item of general contractor's profit, the charge for engineering and supervision being treated as an overhead charge.

Organization Expense. All items which go to make up the cost of organization and administration for construction, including also general office expense, all cost or allowance for brokerage connected with the disposal of the securities, all discounts on securities, all emergency items, an item for contingencies, and all other items not clearly chargeable to construction or to any other specific account, come under this head.

Legal Expenses. This item covers the cost of the legal work necessary in obtaining such rights as may be needed for construction, and other legal expenses incident to and chargeable in the same account. It includes, though, none of the preliminary expense described under the head of development charges.

Engineering. This item covers all the cost of architecture and engineering, including all designs and drafting, plans and supervision of construction, and all of the items properly chargeable to construction engineering.

Interest. This item should include interest on the money paid out during the period of construction. The length of time for which it is to be computed will vary, of course, with the time consumed in the construction of the work, but ordinarily the interest will be charged at the full annual rate for one half of the time during which construction is going on.

Taxes and Insurance. Ordinarily this item includes the taxes which may be charged by the legal authorities against the property previous to its commencing operation, and insurance upon the construction, computed in such manner as may be determined by the local insurance authorities. This should include not only fire insurance, but casualty insurance, covering both employers' and public liability.

Brokerage and Discount. A charge must be made for brokerage, and for discount on bonds sold. These items are now much in question by those handling appraisals, the promoters claiming that they are proper capital charges, but the regulating bodies almost always reject them. However, there can be no doubt of the necessity of charging them in some account, and it is hardly necessary to add that they should also be amortized for either a short or a long life. It is probably the fairest to give them both, or at least discount, the same length of life as that of the bonds. Where both items are relatively small there can be no harm in charging them to interest account at once. Most of the items mentioned and discussed above can be given a true and known value; that is, a fairly well

developed value, but these added together and to the inventory value are seldom enough to account for the entire cost to reproduce. In Germany, I am told, they are accustomed to add a percentage said to represent the average human error of estimating, viz., 8 per cent. The writer is thoroughly of the opinion that some such percentage should be added to every inventory after all the known percentages have been added to make up for any underestimating that is almost sure to exist.

In Shepherd *v.* Northern Pacific Railway Co. (184 Fed. Rep. 764) the findings of Judge Otis, Special Master in Chancery, were confirmed, and regarding the admission of bond discount in determining cost he says:

> "It cannot be said, however, that it is money which has actually gone into the road, but rather an expense which the company incurs for the purpose of procuring such money. If rate making is to be based upon actual cost, it would seem that such cost must be measured by the money necessarily expended in producing the construction without regard to whether those undertaking the enterprise have the same or must borrow for the purpose — a matter in which the public has no concern. If allowed interest during construction on the money invested, more should not be asked; otherwise the rate would be directly affected by the good credit or otherwise of those undertaking the work."

The systems of accounts of the Interstate Commerce Commission and the Public Service Commissions of New York both state that the discount on bonds must no longer be included in construction cost but must be charged to a separate account which must be amortized during a period not longer than the life of the bonds.

W. H. Williams, 3d Vice President of the D. & H. Canal Co., in the *Railroad Age Gazette* of April 2, 1909, in a long criticism of the Michigan appraisal, among other things says:

> "(1) No allowance is made for discount on securities sold.
>
> "Discount is a partial capitalization of the commercial risk had in making the investment, and it increases or decreases in proportion to the probability of the earning power of money under existing conditions. Not only is this practice justified by long-established commercial usage, but also by judicial determination."

Again, taking the opposite view, another author in the same publication says:

> "There is considerable diversity of opinion as regards the proper treatment of discount on securities sold. There is a distinction between bonds representing corporate indebtedness and having a definite limitation as to the time of their redemption, and share capital, representing ownership and which as a rule is irredeemable. In relation to the former there can be but one tenable view. If a company can market its 50-year 4 per cent bonds at 90 per cent of par, it means that the company's credit is on a $4\frac{1}{2}$ per cent basis; that it could market a like security paying $4\frac{1}{2}$ per cent at par. If it elects to issue at the lower rate, it is merely sacrificing principal for the sale of a reduction in the annual interest charge; in other words, it is prepaying interest which would accrue during the life of the issue. If $10,000,000 par value were issued at 90 per cent, the discount would amount to $1,000,000, and the saving in interest to $50,000 per year, or $2,500,000 in 50 years. Obviously the company cannot claim the privilege of capitalizing the discount, while thereby availing itself of the reduction in interest. If such a course were legitimate in the case of a 5 or 10 per cent discount, it would be equally so if the discount were 50 to 75 per cent, when the absurdity of the proposition would be perfectly apparent. The somewhat general practice of prorating the discount as a charge against revenues over the term of the obligation's existence is sound; but this should be done, not in equal installments, but on the basis of the appreciated value of the bond as it approaches par at maturity. There is no apparent objection to charging discount of this nature in a lump sum against an accumulated surplus. The capitalization of discount on stocks, involving as it does the introduction of fictitious values in capital assets, is wholly indefensible."

Some appraisers attempt to divide this percentage into parts representing the proportion chargeable to the different items. This is practically impossible to accomplish, for in its total value it is very much of an estimate or a guess, and it is not good policy to guess at a number of small items when their total would be much in doubt. It is a question in the writer's mind if engineers are not carrying overhead charges to extremes, for in many cases of actual charges to properties constructed, when strict account has been kept, the total of items that may have been considered chargeable to this account is very much less than the percentage frequently used. A study of the cost of street railways as shown in the Reports of the Massachusetts Railroad Commission will aid very much in determining the true percentage to charge. These items are all examined by the Commissioners before being allowed as overhead charges, and in the great majority of cases are charged against the roadway division of accounts, no charges of

any similar nature appearing against any other division. The sum of all the items that could be counted as overhead charges in the twenty-five million dollars spent for the equipment of the New York subway amounted to less than six per cent. This included interest during construction, insurance, engineering, taxes and all contingencies. It is time for engineers to bring forward actual figures for these items, actual expenditures for overhead charges, for at present they seem to be far too high — even those offered by the most experienced engineers. As a matter of fact, it is found that in very few new projects are accounts so kept as to reveal the overhead charges.

One result of the persistence of H. P. Gillette in collating the original costs of the Washington railroads is that the overhead charges are revealed in their true value, as will be seen in the following table:

Overhead Charges as determined from the Books and Accounts of Original Cost of the Railroads in the State of Washington, by H. P. Gillette

Items	Gt. N. 767.75 Miles + 187.06	Gt. N. 488 Miles	W. and Gt. N. 83.9 Miles	F. & S. Ry. 32.3 Miles	S. & N. Ry. 131.5 Miles	N. P. R. R. 1645 Miles	O. R. and N. 501 Miles
	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent
Engineering	2.50	3.23	4.40	3.56	3.50	5.51	2.83
General expense	.28	.26	.08	3.55	1.00	1.22	.48
Legal expense	—	—	—		—	0.1	.02
Insurance	—	—	.01	.06	—	—	—
Interest on advances	.93	1.23	3.25	—	—	—	—
Bond interest during construction	2.44	3.84	—	—	5.25	13.60	2.61
Bond expense	.10	.18	—	—	—	—	—
Taxes	.02	—	.17	—	—	—	.05
Undistributed accounts	—	—	—	—	—	.91	2.64
Total percentage	6.27	8.74	7.91	7.17	9.75	21.25	8.63

Rates of Overhead Charges. — In the Milwaukee Three-cent Fare Case Milton G. Starrett of New York gave as his opinion that the following percentages should be added to the net cost to reproduce new the property of the corporation:

Engineering and Superintendence	4 per cent
Organization and Legal Expenses	2 per cent
Interest during Construction	3 per cent
Contingencies	5 per cent
Discount on Bonds	9 per cent
Working Capital	1 per cent
Total	24 per cent

In the same case Professor M. E. Cooley gave the following percentages to be added to the inventory, as overhead charges.

Added for Contingencies, items	5 per cent
Added for Contingencies, general	5 per cent
Added for Engineering	4 per cent
Added for Insurance during Construction	½ per cent
Added for Organization and Legal Expense	2½ per cent
Added for Interest during Construction	6 per cent
Total	23 per cent

Land value includes 10 per cent of cost of acquiring.

Working capital = average monthly payroll and average monthly vouchers.

Professor M. E. Cooley and his staff also set the following percentages for overhead charges in the valuation of the Michigan Railroads.

Engineering	4 per cent
Legal Expense	½ per cent
Organization Expense	1½ per cent
Interest	3 per cent
Total	9 per cent

Scrap or Salvage Value is the value as old material, or the fair market price of material or apparatus after deducting the cost of removal. Prices for such old apparatus can often be obtained for material in place, to be removed by and at the risk of the buyer. In making up an appraisal it is often necessary to determine the scrap value of the larger items, for it is only the difference between reproduction cost and the scrap value that can be depreciated. In other words, the value of any apparatus or material can never be reduced below the price it will bring as junk. Again, where a factory or public utility plant is in operation as a going concern it is hardly fair to depreciate machinery and apparatus down to junk value, for the reason that as long as it is going and doing its work properly there can be no doubt that it is of considerably more value than

so much junk, even though it has passed what may be considered its fair length of life. In appraising a property or factory that is in operation, it is therefore customary to place what may be considered a *salvage* value on certain apparatus below which it shall not be depreciated. Salvage value is, perhaps, an arbitrary term, or rather represents an arbitrary value, as, in appraising a going concern, this value is ordinarily placed at 20 or 25 per cent of the reproduction value, and the remaining 80 or 75 per cent is alone depreciated.

Wearing or Service Value is that value of apparatus or material that remains after deducting the value of the material as scrap, or the salvage value. The *wearing value* is the value that is depreciated in such manner as may be determined according to the nature of the apparatus or material. This value will entirely disappear in time, either from age, supersession, inadequacy, obsolescence or accident.

Remaining Service Value is the value, over and above the scrap value, of a piece of apparatus, mechanism or material at any time, after deducting the depreciation — of any nature — from the wearing or service value. Depreciation is of several kinds, and each kind has a different effect on the value of the apparatus, mechanism or material, and acts through a greater or lesser length of time. Depreciation will be discussed in a later chapter.

> "The cost of reproduction is one way of ascertaining the present value of a plant like that of a water company, but that test would lead to obviously incorrect results if the cost of reproduction is not diminished by the depreciation which has come from age and use." (Knoxville *v.* Knoxville Water Co. 29 Sup. Ct. 150.)

Some engineers and appraisers maintain that deterioration occurs gradually during the existence of an article, most of it taking place near the end of its natural life. These engineers argue further that because of this slow rate of deterioration the depreciation should be charged off all at once at the end of life, or at such time as a removal or replacement is made. This always results in the robbery of a property and the placing of deterioration or depreciation on the future owners. It is neither a fair nor a conservative method, and in the writer's opinion cannot be too much deprecated. *Remaining service*

value may also be the *wearing value* with *appreciation* added, for it is correct and right that appreciation should be taken into account and has been so indicated by the Supreme Court:

> "And we concur with the court below in holding that the value of the property is to be determined as of the time when the inquiry is made regarding the rates. If the property, which legally enters into the consideration of the question of rates, has increased in value since it was acquired, the company is entitled to the benefit of such increase."

Present Value is the value of an article, machine or piece of property of any kind which is obtained after adding to the *remaining service value* the *scrap* or *salvage value.* Present value is the *worth* of a piece of property as it exists at the time of the appraisal. Present value is sometimes called depreciated value when depreciation has been deducted from reproduction value. While present value is nearly always considered the remaining service value plus the scrap value, yet the term *present value* may also mean the reproduction value with no depreciation deducted or appreciation added.

An appraisal of the property of a public utilities company is occasionally made in order to determine the price a city should be called upon to pay as a purchase price. The *present value* is the one that the courts use in all cases as the value for such a sale. In purchasing a plant at the *present* or *depreciated value,* a city should be prepared to expend an amount of money equal to the difference between the *present value* as determined and the cost to *reproduce the plant new,* in order to put the plant in first-class condition.

Intangible Value is a term used to classify all those expenses that are preliminary to the actual construction of any kind of property, such as the legal expenses of organization; cost of any franchise or permit that may be necessary; value of the property as a "going concern,"—that is, the value of the "going concern" portion of the property; the value of the "good will," if any; and the value of any such developments as have caused expenditure and yet do not show in an inventory, such, for instance, as the value of a horse railway which has been supplanted and displaced by an electrical equipment. In fact, all those expenses of development which call for the expenditure of money and yet do not show as tangible property in a physical valuation of the whole, constitute intangible value.

Development Expense is a term used to include all of the preliminary expenses incidental to the building up of a corporation which are not chargeable in any way to the actual construction of the property.

These preliminary expenses usually embrace any expenditures on account of promotion of a concern; the incorporation and organization, including all incidental and office expenses relating thereto; the cost of procuring the consents of property holders when such are necessary to the corporation; all condemnation proceedings, and, in fact, any work that might be comprehended under the head of legal expenses. Such engineering expenses as are connected with the preliminary or promotion part of the work, comprising surveys, expert estimates, etc., are also included, all or any of which are not embraced in the actual construction of the property; any cost of administration and superintendence incidental to the taking over of an old property, or merging two or more properties, and any other expenses that may be incidental to such merging or taking over. These expenses are all such as would be difficult to locate in any construction or operating accounts, and are properly classed as Development Expenses.

Some appraisers include under the head of Development Expenses interest on capital and bond issues and taxes, including the tax on real estate, mortgage tax, corporation tax, personal property tax, federal and state tax, franchise tax, where any is charged, until such time as the property begins to pay. Incidentally, it may be said that all of these charges should be amortized off the books, but at the present time provision is seldom made for that purpose.

Franchise or License. — Under this heading should be included all expenses necessarily incurred in procuring the franchise for a public utilities corporation, when required, or the license of any other kind for doing business.

It has been customary in the past with many corporations to make a capital charge for a franchise, in order to cover the issue of common stock. This has not always been the case, but it may be said that up to a few years ago it was considered entirely legitimate. In fact, in the New York method of organization of street railways and electric lighting companies it was a very common thing to have the property constructed by some organization, which might be called a construction company and made a con-

tract to take over all of the bonds and stock as a return for constructing the property. The entry on the books of the corporation would be simply, "Railway, — or Lighting Company, — built by Contract;" the price would be the par value of the bonds and stock. This method of bookkeeping naturally included the value of the franchise in the first contract.

Going Concern. — This term is applied to any value that may be placed upon such portion of the property as may be described as "Going Concern," and will be described fully later on.

Good Will. — This term relates to any value which may have accrued to a partnership, company, or public utilities corporation by reason of its having competed with other similar organizations for business. The courts invariably decide that where there is no competition there can be no "Good Will," and therefore no value is allowed for such. This is especially well brought out in the Consolidated Gas Case in New York, and will be referred to later.

In appraising any physical property, its previous history must be studied in order to learn if there have been any expenditures which do not appear in the plain physical valuation, and if any such expenses are found they should be brought to the attention of the parties in interest, and circumstances will dictate whether or not any part of them should be charged or allowed in the value of the property.

CHAPTER II

PURPOSES OF VALUATION

Some of the principal reasons for the valuation of the property of public utilities corporations are mentioned below:

(*A*) *In taxing corporations*, to assure the public that such public utilities corporations are bearing a proper share of the burdens.

(*B*) *In regulating rates* to assure the determination of true and proper rates to be charged the public by the corporations for services rendered.

(*C*) *In the issuance of bonds*, to determine the actual physical value of the property upon which to base the amount of bonds that may be issued.

(*D*) *In determining total capitalization*, to show the amount of additional securities or stock which may be issued.

(*E*) *In the sale and transfer of property*, either a private sale as between two corporations or individuals, or a sale to a city or municipal corporation at the expiration of a franchise, to fix the proper value.

(*F*) *In the establishment of a uniform system of accounting*, to furnish a proper basis for the opening of books.

(*G*) *For the general information of the corporation and the public, for fixing terms of renewal of franchises and for further adjustment of rates.*

(*H*) *In preparing for additions and extensions* to show public officials and the general public the earning power of the property as a basis for the amount of capital necessary to be provided for such improvement.

Again, a valuation should show separate and total values for:

(*A*) *Cost to reproduce the property new.*

(*B*) *Present or depreciated value, as of the date of the appraisal.*

(*C*) *Physical development charges.*

The first cost of the property should be determined, where it is possible to learn this, from the records, as it is sometimes helpful in making up a regular valuation.[1]

[1] See page 13 for original value of Washington Railroads.

The valuation of a factory is ordinarily made for the purpose of a transfer on account of sale, but may be made necessary by reason of transfer among partners, reorganization of a limited partnership or corporation, for determination of a fair rate of taxation, or even for purposes of inventory at the end of a business year. This last item, inventory, is not ordinarily alluded to as an appraisal, as it is commonly made by regular employees of a company and based on unit prices determined by the owners; it should not be considered as an appraisal or valuation.

The value of a factory may be due quite as much to its geographical location as to its physical construction, and sometimes still more to its location in respect to supplies, transportation and market. It is obvious that a factory located in the prairies of the West would have little chance of success as compared with one situated in Ohio or New England, where labor is more plentiful, supplies are easily procured and the market is close at hand; and it would, therefore, have little value other than for the material of which it was constructed. Its intangible or "going concern" or "good will" value would be likely to be very small.

In a paper read before the American Economic Association, Dec. 30, 1909, Professor H. C. Adams made the following three points.

"First. — An authoritative valuation is essential for determining the reasonableness of the price paid by the public for services rendered.

"Second. — Without an authoritative valuation it would not be possible to administer in an equitable manner laws for the control of the issue of securities by public service corporations.

"Third. — The amount which a public service industry should pay over annually to the public treasury, commonly, though erroneously, called taxes, cannot be determined independently of an analysis of the value of the industry considered as a commercial concern.

"In discussing the first of the above points I express my doubt as to the pertinency of the cost accounting principle in dealing with rate questions, and say that if the argument for valuation must rest on the pertinency of this principle the argument is essentially weak. In place of cost accounting I substitute the proposition that the owner of railway property exhausts his right to protest against the reduction or modification of a rate, provided it can be proved that the aggregate revenues cover aggregate expenditures, including a reasonable return upon investments. Beyond that point the rate question is a question of

public interest, and the owner of railway property has no standing in court. The distribution of the total burden between various classes of commodities and service is no concern of the stockholder, except upon the assumption that the distribution threatens to depress the aggregate gross revenues below the constitutional limit.

"In the development of this argument for valuation attention is called to the fact that the item, balance sheet cost, can be viewed from the point of view of either of three interests; namely, the interest of the stockholder who desires that the commercial valuation should be accepted as a measure of balance sheet assets; second, the interest of the management, whose chief interest is in establishing and maintaining the credit of the corporation in order that the corporation may easily borrow money; and, third, the interest of the public, which is chiefly concerned in arriving at a figure which can be accepted as the measure of what the corporation can legally collect as pay for service rendered. The public insists that investment is the measure of a reasonable schedule of rates."

There seems to be a marked unanimity of opinion among writers on railroad valuation that an appraisal of the physical property of a railroad is no criterion of its real value, but that in addition to the value of the physical property, the company should be credited with the many past development expenses, with its "good will" and with its value as a "going concern." Again they claim that earning capacity should largely govern the value.

The Circuit Court of Appeals, Eighth Circuit, July 2, 1894, in the National Waterworks Co. *v.* Kansas City, said:

"5. The difficult question, however, still remains; and that is, what is 'the fair and equitable value' which, by the statute and the ordinance, the city is to pay for the waterworks? . . . We are not satisfied that either method, by itself, will show that which, under all the circumstances, can be adjudged 'the fair and equitable value.' Capitalization of the earnings will not, because that implies a continuance of earnings, and a continuance of earnings rests upon a franchise to operate the waterworks. The original cost of the construction cannot control, for 'original cost' and 'present value' are not equivalent terms. Nor would the mere cost of reproducing the waterworks plant be a fair test, because that does not take into account the value which flows from the established connections between the pipes and the buildings of the city. It is obvious that the mere cost of purchasing the land, constructing the buildings, putting in the machinery, and laying the pipes in the streets — in other words, the cost of reproduction — does not give the value of the property as it is to-day. A completed system

of waterworks, such as the company has, without a single connection between the pipes in the streets and the buildings of the city, would be a property of much less value than that system connected, as it is, with so many buildings, and earning, in consequence thereof, the money which it does earn. The fact that it is a system in operation, not only with a capacity to supply the city, but actually supplying many buildings in the city, — not only with a *capacity to earn, but actually earning*, — makes it true that 'the fair and equitable value' is something in excess of the cost of reproduction. The fact that the company does not own the connections between the pipes in the streets and the buildings — such connections being the property of the individual property owners — does not militate against the proposition last stated, for who would care to buy, or at least give a large price for, a waterworks system without a single connection between the pipes in the streets and the buildings adjacent. Such a system would be a dead structure, rather than a living and going business. The additional value created by the fact of many connections with buildings, with actual supply and actual earnings, is not represented by the mere cost of making such connections. Such connections are not compulsory, but depend upon the will of the property owners, and are secured only by efforts on the part of the owners of the waterworks, and inducements held out therefor. The city, by this purchase, steps into possession of a waterworks plant, — not merely a completed system for bringing water to the city, and distributing it through pipes placed in the streets, but a system already earning a large income by virtue of having secured connections between the pipes in the streets and a multitude of private buildings. It steps into possession of a property which not only *has the ability to earn, but is in fact earning*. It should pay therefor not merely the value of a system which might be made to earn, but that of a system which does earn. Our effort has been to deduce from the volume of testimony that which, in this view of the situation, can be safely adjudged 'the fair and equitable value.' The original cost of the works is not accurately and satisfactorily shown. If it would have assisted us in reaching a conclusion, — if, in consequence of our ignorance thereof, we have not placed the value upon this property which it deserves, — the company is alone to blame, for by the production of its books it could have clearly shown the actual cost of every part and of the whole of this property. There is a large amount of testimony as to the probable cost of reproducing the system, to which strenuous objection is made, on the ground of an alleged temporary and extreme depression in the cost of labor and material. We have before us the estimate placed by two gentlemen of experience and capacity, appointed as commissioners, with direction to report 'the fair and equitable value'; but neither by the order of the court appointing them, nor by their report, are we

advised as to what they considered a criterion of the present 'fair and equitable value.' If they added anything beyond what in their judgment was the reasonable cost of reproduction, we are not advised as to how much they added, or what they took into consideration in making such addition."

For properties for which the writer has had occasion to determine the development charges, "good will," etc., they have been found to be a very small percentage of the value of the physical property, and if the amounts expended for "good will" be taken out of operating expenses where such expenditures are nearly always charged, and are used to increase the current dividend or surplus, it is doubtful if the value of "good will" is not thereby canceled.

In such rare cases as where the actual expenditures for getting business, putting a concern or railroad on its feet, that is, making it a "going concern," are charged in a separate account and not to operating expenses, then it is perfectly legitimate to capitalize this cost until such time as it may be decided to amortize it off the books. Even in these cases, if such expenses are charged to a separate "good will" account, the net earnings are greater by that amount and the dividends may be increased to some extent thereby.

In case of the sale of an old property there can be no doubt that the value of the "good will" which has been accumulating for the whole period of its existence is of considerable moment, and in comparison with a property having an equal physical value, but a shorter term of existence and therefore having accumulated only a limited business, the value of the "good will" increases considerably the total value of the former.

The very basis of the Wisconsin law by which the public utilities of that state are regulated is physical valuation. To be sure, the value of intangibles, such as franchises, good will and going value was early recognized by the Commission, but these values, in all cases where allowed, were figured from the actual cost to the corporation rather than from the earning capacity of the stocks and bonds. In most cases, the companies that had to come before the Commission avoided all contention for a value based upon their net earnings or on stocks and bonds, thus doing away with any claim for a value of franchises or good will. Where it could be shown that there had been money expended for such purposes that it did not appear in any physical valuation but was bound up in such intangible things as building up the business, in fact, mak-

ing the business a "going concern," then these amounts, or an amount as near to the same value as could be calculated, were included in the physical value. It must be admitted that all the valuations in which the Wisconsin Commission has had a hand have been made for the purpose of rate-making and for taxes and not for sales.

The decisions of the Commission are practically final, being rendered so by the wording of the law creating the body; for, if a public utility company brings any evidence into court that has not first been offered to the Commission, the court is obliged by law to return the case to the Commission, which may again investigate the matter and amend its decision and orders in the light of the new evidence. In fact, the Commission becomes the referee who makes the record of facts upon which the court acts. The Commission, in considering the case, is not confined to the strict rules of evidence and is not compelled to limit itself to the evidence given by the parties in interest, but may investigate as it chooses and on its own initiative, and can demand all documents and evidence bearing upon the case.

Mr. Adams says:

> "It is also submitted in this connection that a valuation of the physical properties of municipal electric railways and a comparison of that valuation with commercial valuation is the surest method of determining whether or not a municipal railway can be profitably operated on less than a 5-cent basis."

CHAPTER III

DIRECTIONS FOR THE VALUATION OF TANGIBLE PROPERTY

A complete valuation of a tangible property must show separate totals for the following divisions:

(*A*) Cost to reproduce new.

(*B*) Present value.

Cost to Reproduce. To obtain this total it will be necessary to proceed somewhat as follows:

(*a*) Get an itemized inventory of the entire tangible property. To do this, and to insure that the list is correct, it is well that one man, or party, make the list, or inventory, and that the second man check the same, entering any discrepancies in the list with red pencil.

(*b*) Apply to each item of the inventory a unit cost, which must include the cost of material delivered at the point of work, and of labor, both being as of the date on which the inventory is taken. Where there have been unusual market conditions during the few years preceding, so that the costs of some units which cover large portions of the inventory have varied considerable, it is probably more fair to take the average price for five years. This will apply particularly to copper, to cast iron water pipe, to steel poles, and some few other articles of which very large quantities are used. The Supreme Court of the United States decided in the Consolidated Gas Case that the prices to be used were those of the date of the appraisal, but perhaps this particular portion of the decision was meant to be incidental only, for the reason that in other cases prices have been used which were averaged for the time during which the construction of the particular plant might be going on, and these would seem to be the somewhat fairer prices to use. Another case is, where the material in service cannot be duplicated except at great expense, in which case the price of a modern piece of apparatus which will do the same work must be taken.

(*c*) The cost of reproduction for each item shall be determined

as in its existing form, and considered on the basis of new material of a similar kind, except as noted in clause (*b*).

(*d*) Each unit price used must be on the basis of a subcontract, except where this obviously would be unfair.

(*e*) Add a percentage, say 10 per cent, to the cost of reproduction of all items of construction, such as foundations, buildings, boilers, engines, and other permanent plant, to cover contractor's profit, but no contractor's profit should be added to purely equipment items, such as rolling stock of a railway, etc.

(*f*) To the sum of the cost to reproduce new and the contractor's profit should be added a percentage, commonly from 12 to 15 per cent, covering incidentals, legal expenses, carrying charges, brokerage, contingencies, city inspection, organization, engineering, etc. This is charged on all items except real estate, tools, gas and electric connections, and such other items as are produced by the regular development of the plant. This percentage may be arbitrarily divided into three parts: one third to cover the organization of the company, including legal expenses, together with such general office expenses and superintendence, etc., as may accrue; one third to cover cost of the engineering; and the other third to cover incidentals, contingencies, incomplete inventories, city inspection, carrying charges, brokerage, etc.

Scrap Value. The scrap value of each of the larger items must be fixed at a fair market price, less the cost to the customer for removal. It is difficult in some cases to get the weight of apparatus in order to apply a unit scrap price to it, so where objects are small the value may be taken as a percentage of the cost of reproduction. Considerable judgment will be necessary in using this method, because in some cases materials of large unit value as junk, such as copper, are used in the construction of a machine, although the proportions of copper and other metal may be unknown. However, in the case of large pieces, such as large dynamos, steam engines, boilers, etc., it is far better to obtain their total weight and appraise them for scrap at some unit price for the total, except in the case of dynamos and transformers, where it is fairly easy to determine the proportionate weights of copper, iron, brass, etc., extending each at the unit price for scrap decided upon for such metals. When scrap values are but a small proportion of the total values, it is much better to change the rate of depreciation enough to cover the total value rather than to make use of the scrap value at all.

Salvage Value. This term is used here in contradistinction to scrap value, as meaning the value placed upon an object below which it will not be depreciated for an appraisal, for in a going concern there are many machines, tools, and other pieces of apparatus that may be said to be worth a certain steady value as long as they perform their functions properly, and it is not fair, in appraising such machinery, to depreciate it below this point, and the salvage value is therefore held at some arbitrary point, say 25 per cent of its original or reproduction cost.

Wearing, or Original Service Value. This is the value deduced by subtracting the scrap or salvage value from the reproduction cost new with all percentages added, and it is the value upon which all the depreciation must be calculated.

Depreciation. Depreciation may be described theoretically as deterioration which cannot be made good by repairs, and goes steadily on during the entire life of a piece of apparatus, a building, or other constructed property. Practical depreciation though includes more than the irreparable deterioration, and here will be held as including:

(*A*) Obsolescence.
(*B*) Supersession.
(*C*) Inadequacy.
(*D*) Wear and Tear.
(*E*) Deferred Maintenance.

All of these items will be treated in full in another chapter, but for purposes of an appraisal it may be said that they must be computed at the rate decided upon, for the term of years through which the apparatus, or other article, has been in use, and the total amount of depreciation of all of the different items must be subtracted from the working or original service value. This will leave the

Service value, which is the worth of the earning value that is left in the apparatus, and after adding to it, or putting back with it, the scrap or salvage value, this becomes the *present value* or the worth of the property at the date on which it is appraised.

Physical Development Charges. In the building up of a property of any kind there are always expenditures which do not show in an inventory of the property. Some of these should be included wholly with the cost to reproduce new; others should be included with other property; still others, while they do not appear at all,

doubtless have been made, and should have been taken care of by an amortization fund. These expenditures may be divided into the several classes:

(*A*) Items, the total cost of which should be included in the reproduction value, and are such that a definite estimate can be made of them.

(*B*) Items, only the approximate cost of which can be determined, or for the addition of which the propriety is questioned.

(*C*) Items of such an intangible nature, improper expenditure, indeterminate value or antiquity as to prohibit their addition to the cost of reproduction of the plant.

Permanence of a Valuation. — A valuation may be kept up to date quite readily if desired, readjustments of value being made annually by the deduction of the total annual depreciation from the amount of the original appraisal, and the addition to this final depreciated value of such new apparatus, buildings, or other property and materials as have been purchased during the year. A complication is introduced in the matter of deferred maintenance which must be determined each year at the time of the valuation. This is the amount necessary to put the property into first-class condition, or it may be described as the value of neglect.

Where the values have been based originally on the average prices for a term of years, it will be necessary to revalue the original inventory at the new average as arrived at by introducing the price for the last year into that average for the term of years.

CHAPTER IV

INSTRUCTIONS FOR VALUATION

Engineers and appraisers are many times at a loss as to methods to be adopted, points to be raised, percentages to be allowed, how to value the franchises, etc. Sometimes they are instructed by the court before starting a valuation, but more often each side makes its own appraisal regardless of court procedure, and these values have to be adjusted afterwards in light of testimony taken before the tribunal. It is rarely the case that such well-defined instructions are issued by a court, preceding the valuation, as were given by Judge Savage in an action of the Brunswick and Topham Water District *v.* Maine Water Company. These instructions are printed here in full, and abstracts follow showing other instructions by the same judge, in the similar case of the Kennebec Water District *v.* City of Waterville.

"*Action by the Brunswick & Topham Water District against the Maine Water Company under Priv. & Sp. Laws 1903, 9. 245, c. 158. After the appointment of appraisers the petitioner filed a written request for instructions to the appraisers so appointed. The case was thereupon reported to the law court to determine what instructions, if any, should be given to the appraisers so appointed. Instructions given.*"

"WATER COMPANY — WATER DISTRICT — EMINENT DOMAIN — INSTRUCTIONS TO APPRAISERS — FRANCHISE — VALUATION — DAMAGES — EVIDENCE — PRIVATE AND SPECIAL LAWS. (Sup. Ct. of Maine (59 Atl. Rep. 537), Dec. 14, 1904.)

"In a proceeding for the condemnation and appraisal of a portion of a system of water works by the exercise of the right of eminent domain, under a statute which created a water district composed of two towns, with power to take a specified portion of an entire system being operated in those two and other towns, and which provided that appraisers appointed should fix the valuation of the plant, property and franchises taken, so that the owner should receive just compensation therefor, and, further, that the appraiser should assess damages for the severance of that portion of the plant, property and franchises taken from the owner's entire water system and franchises, the declared intent of the

act being that the amount of the valuation of the property taken, and of the additional damages for severance, if any, taken together, should be so fixed as to equal the difference between the valuation, before severance, of the entire plant property and franchises, and the value after severance of that portion of the plant, property and franchises not taken, both of the last-named valuations to be determined under the principles of eminent domain; and it was further provided that the act itself should take effect when approved by a majority vote of the inhabitants of each of the towns which were to compose the water district, and that such an approval should constitute an acceptance by said water district of the methods of appraisal prescribed by the act, and should bind the water district and the water company thereto — it is *held* that the appraisers should be instructed, among other things, in accordance with the following principles:

"1. In applying the rule that the basis of all calculations as to the reasonableness of rates to be charged by a public service corporation is the fair value of the property used by it for the service of the public, franchise values are not to be disregarded, that the element of going concern value is not to be considered only as involved in structure value, and that property value, in this connection, is not merely structure value.

"2. The fact that the structure taken is in use, and the further fact that it may lawfully be used where it may properly enhance its value.

"3. The direction of the statute to the appraisers to fix the valuation of the plant and of the franchises is, in substance, a direction to fix the valuation of the plant as affected by the franchises.

"4. While actual cost bears upon reasonableness of rates, and as well upon the present value of the structure as such, in estimating structure value, prior cost is not the only criterion of present value. If, by the rise of prices, the present value of the structure is greater than the cost, the owner is entitled to the benefit of it; if less than the cost, the owner must lose it. And the same factors should be considered in estimating the reasonableness of rates.

"5. 'Reasonable' is a relative term, and what is reasonable depends upon many varying circumstances. But in determining what are reasonable rates, so as to produce a reasonable return to the owner upon his investment, the amount of money which has been actually and wisely expended in producing the plant is a primary consideration.

"6. The question of the reasonableness of rates relates to both the owner and the customer. But in case of conflict they must be reasonable to the customer in any event.

"7. A public service company cannot lawfully charge more than the services are reasonably worth to the public as individuals, even if charges so limited would fail to produce a fair return to the owner upon his property or investment.

"8. Profits which, in the aggregate, exceed a fair return on the owner's property and franchises, do involve unreasonable rates, and furnish no criterion of either franchise values or going concern values. But what would be a fair return must depend upon the circumstances of each particular case.

"9. The issue of the reasonableness of rates charged, as well as all other issues affecting value, are to be determined by a preponderance of the evidence.

"10. The value is to be fixed as of January 1, 1904, and in determining the value on that day market prices of materials and labor on that day or during a period long enough before that time for construction, are the standards, rather than former prices. And as, to be completed on that day, the construction of the plant must have been begun before, interest upon the money invested in the plant during construction and before completion is a part of the cost of construction.

"11. Damages for severance are to be allowed as prescribed in the plaintiff's charter.

"12. While it is not constitutionally competent for the Legislature to prescribe a rule of damage, the rules prescribed in this case are to be deemed effective, not because they were established by the Legislature, but because by the approval of the charter they were assented to by the inhabitants of the water district.

"13. In estimating the value of a public service to the public or the customers, one of the elements necessary to be considered is the expense at which the public or customers, as a community, might serve themselves, were they free to do so, and were it not for the practically exclusive franchises of the supplying company. Water is to be regarded as a product, and the cost at which it can be produced or distributed is an important, though not the only, element of its worth.

"14. The worth of a water service in such connection is the worth to the customers as individuals, but as individuals making up a community of water takers.

"15. Communities are entitled to the benefit of existing natural advantages. If there is more than one source of supply, other things being equal, the community is entitled to have the least expensive one used, and the supplying company is not entitled to charge an enhanced rate, based in part, at least, upon the cost of using a more expensive source.

"16. When the rates which furnish a basis for estimating value are earned in part by property taken and in part by property not taken, the appraisers must discriminate, and, so far as value may depend upon rates, they should charge the property taken for only its fair proportion of the earnings.

"17. While the award of the appraisers must be made under the principles of eminent domain, it must be made upon such principles of

eminent domain as were agreed to by the voting constituents of the water district by approving the charter."

"REPORT FROM SUPREME JUDICIAL COURT, KENNEBEC COUNTY

"*Action by the Kennebec Water District against the City of Waterville and others. Case reported. Instructions to appraisers given.*

"On report. Instructions to appraisers given by the court to determine the valuation of property of the Maine Water Company, and acquired by the plaintiff by the exercise of the right of eminent domain." Sup. Jud. Ct. Maine (54 Atl. Rep. 2).

"8. In determining the present value of the company's plant, the actual construction cost thereof, with proper allowances for depreciation, is legal and competent evidence, but it is not conclusive or controlling.

"9. The request that 'under no circumstances can the value of the plant be held to exceed the cost of producing at the present time a plant of equal capacity and modern design' should not be given. Among other things, it leaves out of account the fact that it is the plant of a going concern, and seeks to substitute one of the elements of value for the measure of value itself.

* * * * * * *

"18. The appraisers may properly consider what the existing system can be reproduced for, but the cost of reproduction will not be conclusive. It will be evidence having some tendency to prove present value. The inquiry along the line of reproduction should be limited to the replacing of the present system by one substantially like it.

"19. In estimating even the structure value of the plant, allowance should be made for the fact, if proved, that the company's water system is a going concern, with a profitable business established, and with a present income assured and now being earned.

"20. So far as the water system is practically exclusive, the element of good will should not be considered.

* * * * * * *

"22. In addition to structure values, the appraisers should allow just compensation for all the franchises, rights and privileges to be taken.

"23. The value of the franchise depends upon its net earning power present and prospective, developed and capable of development, at reasonable rates; and the value to be assessed is the value to the seller, and not to the buyer.

"24. In considering prospective development of the use of a franchise, consideration must also be had of the fact that further investment may be necessary to develop the use, and of the further fact that at any stage of development the owner of the franchise will be entitled to charge only reasonable rates under the conditions then existing."

CHAPTER V

FORMS FOR USE IN MAKING A VALUATION

For making the first record of miscellaneous material and for checking the same, the writer in fifteen years' practice has never found any better form than a sheet of letter-size paper with two dollar columns, horizontal rulings one half inch apart, and perforations for the sheets to be carried in one of the many forms of ring binders. This sheet should have a margin of one inch at the left for binding, next a column five eighths inch in width for quantities, and a narrow column at the left of the dollar columns for unit prices, although prices are only attached to these inventory sheets for small and miscellaneous articles and items that cannot be assembled, and where the total number only is used in the tabulation.

In making the first list or inventory of miscellaneous property the person making it should list everything as he comes to it, starting, say, at the right or left of any room, listing each item, proceeding about the place by some well-marked route so that the checker who goes over his work can easily find the items by following the same path. *All classification of items should be left to the office force and not be attempted in the field.* There are some classes of property that can be subdivided for inventorying; for instance, buildings can be put in charge of one division, and in the preliminary discussion the place where buildings end and other materials begin can be settled. Thus: brick stacks, cranes, and building foundations should be listed with the buildings, while machinery foundations belong with the apparatus which they support. In all electrical stations all steam apparatus and appliances can be put in charge of one division, the electrical apparatus in charge of another. Turbo-electric generators are divided in accounting, but should be listed with steam plant. Wiring (not for lighting the building) can be divided into inside and outside, the first running from machine to switchboard and from switchboard to the first fastening outside the building; the second start-

ing at the first fastening outside the building and taking in all distributing lines. High tension transmission lines should be in a class by themselves, but can be in charge of an overhead line division if found most convenient. Underground distribution will quite naturally be in charge of some one familiar with the work in the particular place, for inventory, but can be checked by any one who is competent. Underground distribution will start at the first permanent attachment *inside* the station and end at the service switch inside the customs pressures, the switch to be included. All house connections should be valued from the point where they leave the pole, or main line of subway, or, in case of gas or water services, from the main to the service block or meter inside the customer's premises. A decision of the courts (62 Fed. Rep., 853) has made it plain that although these connections may not belong to the Company, yet they should be valued as a part of the property.

In factories different rooms are ordinarily devoted to separate parts of the manufacturing process, and suitable distinct divisions of the listing will naturally suggest themselves.

What the writer wishes to make plain is the fact that when subdivisions are made for the purpose of listing it is almost impossible to get every item on the list for the reason that the person in charge of one division of lists thinks certain items belong on the list of another division. Care therefore must be taken that in dividing up the work the divisions are most distinct and are such as to cause little trouble from doubt as to who shall include the various items. While every case is different and a properly equipped appraiser should be able to divide his force and develop forms in such manner as to take in all items, a few forms for specific cases of valuation have been included under their special heads.

Class of Men for Listing and Checking. — As to the class of men to do listing, checking, and classifying, the writer has always been able to get his lists from the people owning the property under valuation, except in such cases as have been in dispute, when properly trained engineers, acquainted with the particular work being valued, have been obtained. For checking the lists after the first inventory, young graduate engineers have been found satisfactory for going over machinery, cars, track, poles, wire, etc., but almost any class of men at all familiar with ordinary items can do this checking. It is safe to

say that no inventory was ever made that could not be expanded with items omitted; these must be discovered by the checkers and placed on the lists. For classification, assembling, setting prices, computing, and making final sheets, the writer has come to the conclusion, after long tests, that only trained accountants are fully competent for this part of the work. It is most necessary, however, to have an engineer in charge familiar with the particular class of work being appraised. Many engineering appraisers use young technical graduates almost wholly, but for the final classification and assembly the writer is satisfied that this is not the best practice.

Forms for Classification and Assembly. — Forms for classification and assembly will have to be developed for each class of work in a general appraisal, but for those cases of valuation now coming into prominence, such as for railroads, street railways, electric light plants, gas plants, and water works, there are several forms that can be used with considerable profit, for the reason that they bring to one's attention all the data necessary for a complete valuation. For power house inventory Professor Lucke of Columbia University has issued a book of forms which completely covers all the items contained in an electric power plant. A study of this book will assist greatly in elaborating forms to fit special cases. For general all-round use, though, the forms devised by the Joint Engineering Board of the Wisconsin Railroad Commission and the Wisconsin Tax Commission cover most thoroughly the plants of the Public Utilities Corporations. By courtesy of Professor W. D. Pence, engineer of the board, I am permitted to show herewith copies of these forms. They have been developed from the original forms used in the Michigan appraisal of 1900, improved by those in charge of the Wisconsin Appraisal of 1903, and still further developed by subsequent appraisals with assistance of the railroad officials, and will be still further improved and changed as the chance offers. They should be taken as tentative only, therefore, and subject to change at any time. The forms will be shown, applied each to its own special class of appraisal.

It is only in case of a complete itemized appraisal that it is necessary to collect such detail as is shown in the above-mentioned forms. For limited valuations, where only the most general knowledge of values is required, much simpler forms can be devised. In order that typewriting may be made uniform, the writer has

used a sheet of letter size ruled with double lines for the columns of typewritten figures: this insures keeping figure columns uniformly spaced. It is also handy to have a distinct ruling at top and bottom separating the "brought forward" and "carried forward" figures from the rest. In addition, it is also well to have separate ruled columns, one at the left of the sheet inside the one inch space left for binding, for quantities, and another at the left of the inside dollar column for unit prices. When copies are liable to be wanted, it is well to make the first carbon copy of onion skin paper, with carbon both front and back, so that it will blue print plainly. Another way is to typewrite the final sheets on paraffined paper, which will enable one to make blue print copies as needed. Blue prints are far superior to typewritten copies in the impossibility of error in the print.

Form for Tabulating Final Results of Appraisal. — A convenient form for tabulating an appraisal for adding percentages, for computing depreciation and for determining present value should be made of wide paper with columns enough to develop the headings hereafter described. In such forms every separate division of items and value will show, as well as just what action was taken with each of them.

The first column at the left should be about an inch wide for use in binding. Next should come a column about three or four inches in width which will take the names of all items or divisions. For the purpose of placing proper depreciation it will be necessary to segregate the items by date of installation as well as by name. The following columns can be of any width to suit; the appraiser can judge of this by the character of the valuation or the figures to which he will expect it to amount.

Columns	*Headings*
A.	Year and date installed.
B.	Age, in years, to date.
C.	Cost to reproduce new.
D.	Sub-totals of C.
E.	Per cent for contractor.
F.	Total C + E.
G.	Per cent for engineering and contingencies. Calculated on F.
H.	Total F + G.
J.	Scrap or salvage value to be deducted from H.
K.	Net wearing or service value H − J.

Sheet No. ______________

Compiled by __________ Checked by __________

Date ______________________________________

	5	6	7	8	9	10	
MAINT. G., F. or P.	COND. %	TOTAL COST NEW-SCRAP (1)×(4)	PRES. TOTAL SERVICE VAL. (5)×(6)	TOTAL SCRAP VALUE (1)×(3)	TOTAL COST NEW (1)×(2)	TOTAL PRES. VALUE (7)+(8)	
Size of	sheet	$8\frac{1}{2}'' \times 19''$					

Follow here with a double line of ruling.

L. (rate) Obsolescence or supersession.
M. (rate) Inadequacy.
N. (rate) Age and wear and tear.
O. (rate) Deferred maintenance.
P. Total depreciation $L + M + N + O$.

Follow here with a double line of ruling.

R. Remaining or service value after deducting P, or $K - P$.
S. Scrap or salvage value, to be added to R (same as J).
T. Total present value $R + S$.

Follow here with a double line of ruling.

U. Annual depreciation at the current rate and,

$$U = \frac{L + M + N}{B} + \text{Deferred maintenance at the date of appraisal.}$$

The above-described form is for use in connection with the most elaborate appraisal. The form for summarizing the items of a power-plant, as devised by the Engineering Board of the Wisconsin Commission, is shown on the following page. The only important modifications are use of dollar values only, and the use of "Condition, per cent" in connection with depreciation. This item is fully described in the chapter on "Depreciation," and tables are furnished for the values. The forms 599 and 600 are two others devised by the Joint Engineering Department that are used for the detailed and final summaries.

Valuation of Real Estate. — In appraising the *Real Estate* owned by a Public Utilities Corporation, consideration will have to be given to the purpose for which such property is to be used; for instance, the value of a site for a steam power station with a necessity for getting in fuel, having condensing water handy, etc., will be quite different from that of a site for a car barn, which may be located on relatively cheaper property, or at least on property subject to different influences. The site for an office building may be combined with that for a sub-station or even with that of a car barn.

The value of railroad real estate is subject to more variations and to more influences than that of any other public utility. Particularly is this so for terminals. Rights of way are ordinarily purchased by the acre at a price considerably in advance of the

Form 599

Joint Engineering Dept.
Wis. Tax & R.R. Commissions

Sheet No._________

DETAILED SUMMARY

Valuation as of________________

Company _________________ Date Compiled________________

Location_________________ Compiled by_________________

Checked by_________________

Item	Unit	Quantity	Unit Price		Cost of Reproduction	Scrap Value	Cond. %	Present Value	

Size of sheet $8\frac{1}{2}'' \times 11''$

Form 600

Joint Engineering Dept.
Wis. Tax & R.R. Commissions

Sheet No._________

FINAL SUMMARY

Company________________

Location________________

Valuation as of_______________

Date Compiled_______________

Compiled by_________________

Checked by_________________

For typewriting
Size of sheet $8\frac{1}{2}'' \times 11''$.

local prices for farm land. In passing through populated cities it is often necessary to use village or city lot values. In appraising a terminal the location and surroundings will determine the value, which is almost invariably much in advance of the original purchase price. In fact, a terminal influences both ways; the value of the surrounding property may have increased greatly, due to the proximity of the terminal, and the value of the terminal site itself may have been greatly enhanced by the construction of warehouses and other buildings built to take advantage of its proximity. The value of real estate belonging to a factory will vary with its location as regards railroad connections and water transportation, its proximity to the central or business portion of the community in which it is situated; in fact, it is subject to precisely the same influences as is the other adjacent real estate. The value of real estate is the one item that more than any other is liable to appreciate, and at times this appreciation of value is used to increase the capitalization. The Supreme Court has decided that this appreciation of land values must be allowed in any appraisal, and it certainly is a legitimate value, but it has always been a question with the writer whether it is right to consider the increased value as a part of capital. It does not seem proper to pay dividends on an increment which is not an investment, although a perfectly legitimate part of the property owned by the corporation. In fact it is entirely possible that such increment might become so large that the regular charge or rate for the use of the products of the public utility company would be prohibitive, or if the rate is a fixed one, as in street railway fares, would not produce sufficient income to meet a fair rate of interest on the fair increase of value. If placed in the surplus this increment would be reflected in the market value of the shares, which could be sold for an amount representing the addition of the increase in value. Should the property be reorganized under a new name, or should it be sold, the advance in value of the real estate would be carried by the price paid, and would have a tendency to balance any depreciations in other parts of the property. In other words, thus, nothing should be added to capital for appreciation any more than that the capital should be decreased because of depreciation. The following extract from Treasury Decisions shows how the government looks upon increase of land values on account of the special Excise Tax.

"43. Profits realized on sale of real estate during the year, also increase in value of unsold property, if taken up on the books of the corporation, to be included in income."

* * * * * * *

"62. In the case of lands bought prior to January 1, 1909, and sold during any subsequent year, the profits arising from such sale, if no accounting of increased value of land was made in returns for previous years, should be prorated in accordance with the number of years the land was held by the corporation and the number of years the law was in effect." (Internal Revenue T. D. 1742, Dec. 15, 1911.)

The value of a factory site may become so great through growth of its surroundings that it can be sold for enough to purchase a new site and to construct new buildings better adapted to the purpose, better situated as regards transportation facilities, and many times better located for accessibility of the labor employed. In such a case it would of course be folly to hold the land longer. Matheson says:

"While, however, it may be equitable in the case of a change of partners or business to revalue the site, or take into account its prospective value, the possible increment should not be mixed up with the annual accounts of the undertaking farther than to justify the maintaining the capital value of the land itself without depreciation."

Again, in valuing a railroad terminal, should the land be treated as vacant, in which case there would have been no surroundings built up for use of the terminal, and therefore no advance in value due to increased value of the surrounding territory? Next, in valuing the surrounding real estate, should it be valued with buildings and other improvements, or as unimproved real estate of increased value due to the adjacent terminal? There are many other questions which arise in such an appraisal.

In appraising land values, ordinarily the price obtained at the last sale of the property will be the basis of a new price, but when the values have been much increased from any of many circumstances, it will be necessary to compare unit prices of the land under consideration with those of adjacent territory, or sales of near-by property, influences of other property on that being appraised, and lastly by a comparison of values placed by the assessor. Growth and prosperity of a city influences land values for an increase; the location of undesirable industries adjacent to land often acts to depreciate its value. The appraisal of land is a job for experienced heads and even then the best of

land appraisers will sometimes arrive at widely differing results. One of the latest discussions of the handling of land values is that of Commissioner Maltbie "in the matter of the Gas and Electric Rates Charged by the Queens Borough Gas and Electric Company," dated June 23, 1911. On the subject of appreciation of land the Commissioner has the following to say:

Appreciation of Land

"Land differs from most property in that it generally appreciates in value, and the question has been raised, whether land should be included in 'fair value' in rate cases at its original cost or at its estimated value at the time the rate is to be fixed. It is well settled that other property should be taken at its *then* value, but it has been argued that in the case of land the original cost should be used. Counsel for the City of New York in the Consolidated Gas case endeavored to establish this principle, urging that return should not be allowed upon money never spent and that appreciation of land does not represent any investment. Mr. Justice Peckham who wrote the opinion in this case said (*Willcox v. Consolidated Gas Co.,* 212 U.S., 19, decided Jan. 4, 1909):

" 'And we concur with the court below in holding that the value of the property is to be determined as of the time when the inquiry is made regarding the rates. If the property, which legally enters into the consideration of the question of rates, has increased in value since it was acquired, the company is entitled to the benefit of such increase. This is, at any rate, the general rule. We do not say there may not possibly be an exception to it, where the property may have increased so enormously in value as to render a rate permitting a reasonable return upon such increased value unjust to the public. How such facts should be treated is not a question now before us, as this case does not present it. We refer to the matter only for the purpose of stating that the decision herein does not prevent an inquiry into the question when, if ever, it should be necessarily presented.'

"Commissioner Lane, of the Interstate Commerce Commission, discusses the subject in his opinion in the '*Western Advanced Rate Case,*' and says (20 I. C. C. Rep., 344, decided Feb. 22, 1911):

" 'Whatever the true economic or legal view may be as to the right of a carrier to consider the increase in value of its land as a part of the value upon which it is entitled to a reasonable return, such increase in value does not of itself establish the right of a carrier to increase rates upon a given service. Certainly if the Supreme Court may decline to lay down the absolute rule that "in every case failure to produce some profit to those who have invested their money in the building of a road is conclusive that the tariff is unjust and unreasonable," *Reagan v.*

Farmers' Loan & Trust Co., 154 U.S., 412, it is a conservative statement of the law to hold that a railroad may not increase the rates upon a number of commodities solely because its real estate has risen in value.'

"While it is evident, therefore, that each case must be decided upon the facts peculiar to it, the Commission believes it proper in this case to follow the general rule, as stated by Judge Hough of the United States Circuit Court (*Consolidated Gas Co. v. City of New York*, 157 Fed. Rep., 855):

"'Upon reason, it seems clear that in solving this equation the plus and minus quantities should be equally considered, and appreciation and depreciation treated alike. Nor can I conceive of a case to which this procedure is more appropriate than the one at bar.'

"Thus, land has been taken at its fair value and not at its original cost, and the annual appreciation of land has been treated as a profit. By this method, all property is treated absolutely alike, as Judge Hough suggests. No difference is made, except that as depreciation represents a decrease in assets, it is placed as a *debit* against operation, while appreciation is placed as *credit* because it is an increase in assets. Land has sometimes been treated like other property only to a degree; that is, each class has been appraised at its present worth or value. That has been done in this case. But if property is to be taken at its *depreciated* value where it has depreciated, an entry must regularly be made in estimated operating expenses equal to the average annual depreciation. Conversely, if land, or any other property which genuinely appreciates in value, is to be taken at its *appreciated* value, then an entry must be made in the estimated receipts equal to the average annual appreciation. Unless this is done, it is obvious that the consumer will be burdened with all the estimated decreases in assets, but not credited with the increases in assets. If the principle laid down by the courts is to be followed in part, it should be followed in whole.

"It is suggested that the annual increase in the value of land which is treated as income is not actually received. Increase in the value of unoccupied land is not realized until sold or put into use, but it is real, nevertheless, although payment may be deferred. Likewise, payments to the depreciation fund are not actually expended; yet they have been considered legitimate charges in practically every case. Furthermore, the *annual* increment is no more indefinite than the *total* increment — the present value. But if the present value can be determined, it is possible to determine past *annual* appreciation with positive accuracy, for it is only a simple mathematical calculation. It is also probably as easy to estimate increases in the near future as it is to estimate what obsolescence, which is a form of depreciation, there will be in the future.

"Indeed, the problem of handling appreciation is much simpler than depreciation. If the property is growing more valuable, the investor

need not worry; and if the state recognizes his right to earn a fair return upon the increase, he is fully protected. It is not necessary that the increase be represented by stocks or bonds, for if the earning power is there, he will receive a return thereon, regardless of the amount of securities. In fact, the existence of an increase which is not represented by securities is an element of safety, a reserve fund of a valuable kind.

"There is a further similarity. The exact amount of depreciation and the annual rate are not definitely known until the piece of property is actually replaced or has become useless. The total appreciation and the average annual rate are not known until the land is sold, but when it has been disposed of (and plants are continually being removed and the land sold), they become absolute certainties. Why should these matters be considered less definite when applied to land than when applied to the buildings thereon? The depreciation of the buildings is a charge against operation; why should not the appreciation of land be a credit?"

Note on title in fee: It is not necessary that the title of the company to all the lands upon which its works are built or through which its pipes are laid should be a fee simple, perfect in every particular and subject to no criticism. An irrevocable license, for instance, would be sufficient, or a title based upon prescription. If, however, there should be found substantial defects, opportunity should be given the company to remedy them; and if it is unable to do so, the parts of the property so circumstanced can be valued and the purchase price abated accordingly. It would be expressing too narrow a view to say that an appraisal of a great system of waterworks under a contract of purchase must fail because the title to a small part, not vital to the integrity of the system, was afterwards found to be defective. That the deed tendered by the company was not such as the city was required to take is immaterial. It is sufficient that the company was able, ready and willing to do what might lawfully be required of it. (City of Omaha *v.* Omaha Water Company, May 31, 1910. 159 U.S. Circuit Ct. of Appeals.)

Forms for Use in the Appraisal of Real Estate. — I am showing on the following page the headings as arranged by the Joint Engineering Department of the Wisconsin Commission.

Appraisal of Buildings. — The proper appraisement of buildings is best accomplished by making a complete bill of materials of each, and then applying to the items unit prices for the material and labor applicable in the locality. This is handled most satisfactorily by an architect, builder or engineer who is acquainted with building construction in the particular locality under consideration.

Another, and one of the most common ways, is to apply a unit

FORM 1

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

LAND FOR RIGHT-OF-WAY YARDS AND TERMINALS

Show joint lands separately and indicate division of ownership

Name of Road: ....

Limits ....

Railroad Valuation of June 30 ....

.... Compiler

Date ....

No. of Valuation Section	County	Name of Incorporated City, Village or Town	Trackage Rights, Miles	GENERAL DESCRIPTION AND IDENTIFICATION OF TRACT	Acres Right-of-Way	Acres Yards and Terminals	Average Value Per Acre	Total Cost to Ry. Co.

FORM 2

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

REAL ESTATE

Show joint lands separately and indicate division of ownership

Name of Road: ....

Limits ....

Railroad Valuation of June 30 ....

.... Compiler

Date ....

LOCATION	DESCRIPTION	PURPOSE FOR WHICH USED	QUANTITY ACRES	VALUE PER ACRE	TOTAL COST TO RY. CO.

Size of sheet $8\frac{1}{2}'' \times 14''$

price per cubic foot of contents, and one must have a wide acquaintance with various types of buildings because the price per cubic foot varies greatly with classes, and also with the size. Even with buildings in the same class and type the price per cubic foot will be found to vary considerably.

In New England the favorite method of appraising buildings, particularly factory buildings, is by the square foot of floor space. This method applies particularly to textile mills and to warehouses, but again, one must have a wide acquaintance with buildings of these two types to accurately value them.

In measuring buildings for computing the cubic foot value, the dimensions should be taken from outside to outside of all walls, and from the bottom of the foundation to the roof, if a flat roof, or to the top of the attic walls if a high roof, and to an average height of a peak roof.

In measuring for value according to the New England or floor surface method the dimensions should be taken *inside of pilasters*. Some engineers include the area of the basement in lieu of that of the roof, others use the dimensions of the working floors only, omitting the basement or roof.

On the Pacific Coast a great many corrugated iron covered buildings are used, and a favorite and perfectly logical method of valuation is by the square foot of surface, including roof and sides, and adding the floor at a proper rate for the cost per square foot. The Los Angeles aqueduct built dozens of these corrugated iron structures and found the average cost to be approximately $12\frac{1}{2}$ cents per square foot of outside surface.

The concrete in buildings constructed of that material should be reduced to cubic feet, and a price per cubic foot then should be applied. If the roofs are of steel, that material can be calculated at a price per pound erected, applicable for the locality. Also the steel reënforcement must be calculated and added to the value of the concrete.

Forms for Use in the Appraisal of Buildings. — On pages 55 and 56 are shown two forms, one as devised by the Joint Engineering Department of the Wisconsin Commission, and another, a form of summary by the writer.

THIS SPACE FOR BINDING.

Wisconsin Valuation
as of Date ....
Name of Co. ....
Location ....

W. B. A. FORM 541

PRELIMINARY BUILDING STATEMENT

Sheet No. ....
Compiled by ....
Date ....

Book No.	Article	Description	Units	Quantity	Unit Cost	Total Cost	Remarks

Size of sheet $8\frac{1}{2}'' \times 11''$

Form of Summary for Use in the Appraisal of Buildings

	Reproduction Cost New	Present Value
1. Excavation		
2. Material in foundation		
3. Material in walls		
4. Steel frame		
5. Roof		
6. Steel in roof		
7. Windows and doors		
8. Interior finish		
9. Heating		
10. Plumbing		
11. Lighting		
12. Painting		
13. Miscellaneous		
14. Total of items, 1–13		
15. Add percentage		
16. Total of items, 14 and 15		

Railroad Valuation. — In suggesting methods of evaluating railroads, one can hardly do better than to recommend the use of a form of summary similar to that proposed by W. D. Taylor, late Engineer, State Board of Assessment of Wisconsin, June, 1903. This form includes "Cost of Reproduction" and "Present Value," with all percentages for overhead charges arranged in their proper places. In this summary it will be noticed that "real estate," item No. 30, is included among the first items to which a percentage is added. This is a point to which one might take exception, as ordinarily it is not correct to add a percentage to the value of real estate. The engineers of the Wisconsin Commissions admit this, but say that the percentage would have to be increased should the real estate be taken from that part of the list. Following is the form known as "W. B. A. Form 101," and after that will be found a description of the plan as devised by Mr. Taylor. Only those items and descriptions pertaining directly to the subject are contained in this abstract.

Form 101
JOINT ENGINEERING DEP'T
WISCONSIN TAX AND RAILROAD COMMISSIONS

Physical Valuation of Railroads, June 30,....

Name of Road.. Compiled by..................
Date........................
Limits.. Checked by ....

FINAL SUMMARY SHEET

Section No......

Miles 1st Main Track.........
Miles 2d Main Track.........
Miles 3d Main Track.........
Miles 4th Main Track.........
Miles Joint Main Track.........
TOTAL MAIN TRACK........

TOTAL MILES CROSSOVERS..

Miles Branch Main Track..........
Miles Branch Joint Track..........
TOTAL BRANCH MAIN TRACK....

Miles Spurs and Sidings............
Joint Spurs and Sidings............
Joint Spurs and Sidings............
Joint Spurs and Sidings............
TOTAL SPURS AND SIDINGS......

SUBJECT	Cost of Reproduction Property New	Present Value
1. Land for Right-of-Way, Yards, and Terminals		
2. Real Estate..		
3. Grading		
4. Tunnels		
5. Bridges, Trestles, and Culverts.............................		
6. Ties..		
7. Rails		
8. Frogs and Switches		
9. Track Fastenings and Other Material.........................		
10. Ballast		
11. Track Laying and Surfacing.................................		
12. Roadway Tools		
13. Fencing and Cattle Guards...................................		
14. Crossings and Signs		
15. Interlocking and Other Signal Apparatus.....................		
16. Telegraph and Telephone Lines...............................		
17. Station Buildings and Fixtures..............................		
18. General Office Buildings and Fixtures.......................		
19. Shop, Engine Houses, and Turntables.........................		
20. Shop Machinery and Tools....................................		
21. Water Stations..		
22. Fuel Stations...		
23. Grain Elevators...		
24. Storage Warehouses..		
25. Dock and Wharf Property.....................................		
26. Light and Power Plants......................................		
27. Power Transmission..		
28. Miscellaneous Structures....................................		
29.		
TOTALS 1–29 INCLUSIVE		
30. Engineering, Superintendence & Legal Expenses, Per Cent 1–29 Incl.		

	Cost of Reproduction Property New	Present Value
31. Locomotives.............		
32. Passenger Train Cars....		
33. Freight Train Cars.......		
34. Miscellaneous Equipment		

	Cost of Reproduction Property New	Present Value
TOTALS 31–34 INCLUSIVE		
35. Inspection and General Expenses........Per Cent 31–34 Incl......		
TOTALS 1–35 INCLUSIVE		
36. Interest, Organization, Contingencies......Per Cent 1–35 Incl......		
37. Stores and Supplies on Hand for Use in Wisconsin............ ...		
GRAND TOTALS		
TOTAL PER MILE OF MAIN LINE.....		

Size of sheet $8\frac{1}{2}'' \times 14''$

Plan Adopted for Finding the Physical Value of Wisconsin Railroads

June 1903.

"I. *Cost of Reproduction.* The first step required in the appraisement of a road will be to get the cost of reproduction of the physical properties of the road. The several items comprising the physical properties of the usual railway are enumerated from 1 to 37 on the sheet shown on the previous page, which sheet also shows certain fixed percentages to cover certain items. The cost of reproduction is assumed to be what it would cost to reproduce the road at the average prices prevailing for the period of five years ending June 30 of the year, entirely new in every particular, in, say, two or three years' time, if the entire railroad were eliminated — its right of way, yards, stations and terminals passed into other hands and occupied by just such woodlands, waste lands, farms, industries and residences as those now existing in and on the adjoining country and property.

"II. *Present Value of the Physical Properties.* The second step shall be to obtain the present value of the physical properties. By the present value of a road is meant an amount which equals the cost of its reproduction minus an amount covering the depreciation in value from time, wear, etc. Thus the cost of reproduction and the present value of the land on which the road's right of way and terminals are located are the same, but the cost of reproduction and the present value of steel rails are likely to be quite different. Thus, if the market value of new steel rails is $28.00 per ton, and the scrap value $12.00 per ton, the wearing value is $16.00 per ton; and if at the present time 40 per cent of the life that the rail can be used in the road has been used up, the rail is in 60 per cent condition, and its present value per ton would be $12.00 plus 60 per cent of $16.00, or $21.60 per ton.

"In the determination of the present value of the property the field notes taken on making this appraisal must be very carefully made, and the condition of each item of property must be recorded in the field as a percentage of maximum efficiency, or in what is sometimes called 'The value in per cent of new.' This 'condition percentage' should never be omitted and should be written on the accompanying blanks after the description of each article in case there is no space on the blanks for its insertion. In important structures, such as a steel bridge or roundhouse, it would be better to give the condition percentage of the important parts of the structure. Thus the masonry of the bridge may be in 90 per cent condition and the superstructure in 60 per cent condition.

"III. *Determination of Land Values.* In finding the value, for the purpose of this appraisal, of the land (exclusive of the improvements constructed by the railway company) for the right of way, yards,

station grounds and terminals, the land shall be divided into the following classes:

"Class 1. Barren lands.

"Class 2. Farming lands.

"Class 3. Land in villages of less than 500 people.

"Class 4. Land in cities and villages of between 500 and 3000 people.

"Class 5. Land in cities and villages of between 3000 and 10,000 people.

"Class 6. Land in cities of over 10,000 people.

"Barren lands are lands nearly or quite worthless for crops, hay or grazing.

"In this appraisal the value of the land for other purposes must be determined by getting as accurately as is reasonably possible the average value at the various county seats as shown by the records of the transfers of property for the five-year period ending June 30, — in the section traversed by the road; and by consultation with disinterested, local, reliable real estate and business men, bank cashiers, etc.

" *The Right-of-Way Value.* The term right-of-way is intended to include the land for stations, yards and terminals.

"Two distinct results should be obtained, namely, first, the market value per acre of the land for other purposes, and, second, the value per acre as right of way. The first is to be obtained in the manner explained above. The second should be obtained by taking the average market price for other purposes of the land actually within the right of way and by adding thereto the damages to the adjoining property forming a part of the same parcel which are directly attributable to the proper construction and operation of the railroad across that portion of the land taken." [1]

The inquiry will be first, what is the fair average price per acre for ordinary purposes of the land taken? and, second, how much is the depreciation in the salable value of the residue of the parcel, lot or tract with the building thereon from which the right of way is severed? The sum of the two items, first, the market price of the land taken, and, second, depreciation in the salable market value of the residue, will constitute the right-of-way value.

"The right-of-way value per acre may be ascertained and determined by agreement between the agents of the railway company and the owner, on the above basis, at the five-year average market price per acre

[1] For railroad right-of-way the value of city property as determined by all the methods is multiplied by a factor of 1.5, and the value of real estate in the country districts by 2.5. The records of more recent purchases for the past three years (Oct. 1, 1911) show that the factor 2.5 for country lands should be more nearly 3.

for the land within the right-of-way, plus the depreciation in the market value of the residue not taken, the parties knowing that the land is to be used for railway purposes and being disposed to agree upon a fair, reasonable and just sum as the price of the land and the damage to the land of which the right-of-way was a part.

"In determining the value of land for other purposes within the right-of-way, such value will be ascertained by taking the market value of the bare land without including the value of buildings. To this value of the right-of-way will be added the depreciation of the market value of the residue from which it is taken, and this will include the depreciation not only to the land itself, but to any buildings that may be upon such land.

"IV. *Grades and Curves not considered in the Valuation.* In this appraisement no attempt will be made to take into account the economic value of grades and curves or the absence of them; that is, each road will be appraised just as if it were a straight line and as if its grade line were level throughout.

"V. *Industrial Tracks.* In this appraisement the roadbed and tracks, grading, bridges, culverts, etc., of all 'industrial tracks' operated by a railway company shall be scheduled as the property of the railway company except where it can show that such property does not belong to the company; but the right of way and the adjacent buildings shall not be so scheduled unless the railway owns them outright.

"VI. *Apportionment of Rolling Stock of Interstate Roads.* The amount of the rolling stock and miscellaneous equipment to be credited to the State of Wisconsin will be found by finding first the number of all the different classes of locomotive, passenger and freight cars, and miscellaneous equipment of the whole system; then the number of each class of Wisconsin locomotive, passenger cars and freight cars shall be apportioned in the same ratio as the annual locomotive, passenger car and freight car mileage of the whole system in Wisconsin bears respectively to the total annual locomotive, passenger car and freight car mileage of the whole system in all states. The actual value of special equipment exclusively used in Wisconsin is to be specifically ascertained; but such equipment as wrecking outfits, steam shovels, etc., which is to be used both in and without the State, shall be prorated according to the same ratio above described for rolling stock or in the ratio of the time in use within the State to the whole time in use within and without the State.

"If in any case for any reason the mileage record cannot be ascertained on which to base this calculation, the apportionment for rolling stock shall be prorated in the same ratio as the total length of track in Wisconsin — including main line, branches, second track, spurs and sidings, — bears to the total length of track of the entire system.

"In arriving at the 'percentage condition' of rolling stock on large

interstate roads, there shall be indiscriminately inspected at convenient points or terminals within or contiguous to the State 50 per cent of each class of the road's locomotives and 50 per cent of each class of the road's passenger service cars in actual use, wholly or partly, in Wisconsin, and the average percentage condition so obtained shall be taken to represent the condition of the whole class of cars or locomotives.

"The 'percentage condition' of each class of freight cars shall be established similarly by actual inspection of not less than 20 per cent of as many cars of each class of the road's cars as the company's books show should be apportioned to Wisconsin under the above rule of apportionment. In the inspection of freight cars the inspectors should work in pairs, and in order to identify cars that have already been inspected, the inspectors should carry hammers with which they can imprint with a blow the initials 'W. B. A.' on the needle beam of the car. As large a proportion as possible of the rolling stock of the smaller roads operating entirely within the State should be inspected. No attempt should be made to determine in the field the actual value of rolling stock, but the actual value for each class should be determined from the records of the usual actual purchases or by reliable information secured from reputable manufacturing concerns as to the market value.

"The form shown on page 57 will be used for summing up the values for all of a division of a road within the State; and for summing up the values of all of a whole system within the State, including the rolling stock, etc."

Forms for Use in a Railroad Appraisal. — Following will be found copies of the headings and spaces devised by the Joint Engineering Department of the Wisconsin Commission. Forms for use in appraisal of land and buildings will be found under the headings of those subjects. It will be noticed that the forms for track may be used equally as well for street railways, as may be some of the other forms.

Revised Valuation Forms for Steam Railroads. — The accompanying blank forms are supplied to the steam roads of the state for use in reporting annual revisions of inventory of the physical property, including all cases of new construction. The forms used in the 1903 Wisconsin appraisals and for several years thereafter were similar to those employed in the Michigan railroad appraisal of 1900. In undertaking to revise these forms two principal objects were in view: (1) To obtain from the railroad companies more complete detailed information as to physical conditions and actual costs; (2) To make the group-

ing of inventory more consistent with the classification of accounts for steam roads prescribed by the Interstate Commerce Commission, in the hope that eventually there may be substantially uniform practice in the valuation methods followed in the different states.

Acknowledgment is made of valuable criticisms and suggestions submitted by representatives of the various roads and others in working out the details of these forms.

FORM 4

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

TUNNELS

Show joint property separately and indicate division of ownership

Name of Road: ....

Limits ....

Railroad Valuation of June 30..............................

.... Compiler

Date ....

Location	Length in Feet	EXCAVATION					LINING			BACK FILL			PORTALS		
		Cross Section		Material	Total Cu. Yds.	Price Per	Material	Quantity	Price Per	Kind	Quantity	Price Per	Material	Quantity	Unit Cost
		Kind	Sq. Ft.												

Location	Length in Feet	VENTILATION		DRAINAGE		LIGHTING		OTHER ITEMS		Total Cost of Tunnel	Remarks
		System	Total Cost	Kind	Total Cost	System	Total Cost				

FORM 3

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

GRADING

Show joint work separately and indicate division of ownership

Name of Road: ....

Limits ....

Railroad Valuation of June 30..............................

.... Compiler

Date ....

Location	CLEARING			GRUBBING			PROTECTION WORK							
							Rip Rap		Retaining Walls			Other Protection		
	Quantity	Width	Unit Price	Quantity	Width	Unit Price	Cu. Yds.	Unit Price	Kind	Quantity	Total Cost	Kind	Quantity	Total Cost

Location	EXCAVATION—PAY QUANTITIES										SURFACE DITCH OR CHANNEL CHANGE. EXCAV.		BRIDGE FILL	
	Earth		Solid Rock		Loose Rock		Hard Pan		Over-haul					
	Cu. Yds.	Price	Cu. Yds.	Price	Cu. Yds.	Price	Cu. Yds.	Price	Cu. Yds. Hauled 100 Feet	Price	Quantity	Price	Quantity	Price

Size of sheet $8\frac{1}{2}'' \times 14''$

FORM 6A

JOINT ENGINEERING DEPT

WISCONSIN TAX AND RAILROAD COMMISSIONS

DRAW BRIDGES

List each draw span separately

Name of Road: ....

Limits..

Railroad Valuation of June 30..

.... Compiler

Date ....

SUBSTRUCTURE

Bridge No.	State if New, Rebuilt, Extended or Shortened	Distance Bridge Seat to Footing	No. of Abutments	No. of Piers	PILING: Total Lin. Ft.	PILING: Price Per Ft. in Place	FRAMED TIMBER (Incl. Cribbage): Total Ft. B M.	FRAMED TIMBER (Incl. Cribbage): Price Per M. Ft. B M. in Pl.	MASONRY: Kind and Class	MASONRY: Cu. Yds.	MASONRY: Price Per Cu Yd Incl. Excav.	COFFER DAM (State if Incl in Masonry Cost): Kind and Size	COFFER DAM: Total Cost	Year Built	Ave Per Cent Cond.	Total Cost Substructure

SUPERSTRUCTURE

Bridge No.	TYPE (Swing, Double or Single Leaf Lift, Etc.)	Length of Draw Span	No. of Tracks Carried	Loading Specifications	Weight of Steel	Cost Per Lb. in Place Incl. False Work	Year Built	Cond Per Cent	DECKING WITH GUARD RAIL (If Metal Guard Used Give Kind and Size): Kind	Cost Per Lin. Ft in Place	Year Built	Cond Per Cent	Total Cost Superstructure

Bridge No.	OPERATING MACHINERY: DESCRIPTION (Hand, Electric, Air, Gas or Steam. Size and Type)	Year Built	Total Cost Installed	Cond. Per Cent	Kind of Turntables	Kind of Locks	OPERATOR'S HOUSE: Material	Size	Year Built	Cost	Cond. Per Cent

Size of sheet $8\frac{1}{2}'' \times 14''$

FORM 5

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

BRIDGES

Steel Truss, Girder, and I Beam Spans. See Form 5A

Include overhead bridges and under grade crossings erected at expense of Railway Co., and identify as such

Show joint structures separately and indicate division of ownership

Name of Road: ....

Limits ....

Railroad Valuation of June 30 ....

.... Compiler

Date ....

SUBSTRUCTURE

Bridge No.	State if New, Rebuilt, Extended or Shortened	Distance Bridge Seat to Footing	No. of Abut-ments	No. of Piers	PILING		FRAMED TIMBER (Incl. Grillage)		MASONRY			COFFER DAM (State if Incl. in Masonry Cost)		Year Built	Ave. Per Cent Cond.	Total Cost Substructure
					Total Lin. Ft.	Price Per Ft. in Place	Total Ft. B. M.	Price Per M. Ft. B. M. in Pl.	Kind and Class	Cu. Yds.	Price Per Cu. Yd. Incl. Excav.	Kind and Size	Total Cost			

SUPERSTRUCTURE

Bridge No.	No. of Spans	Length of Spans	Kind of Bridge	Total Length of Bridge	No. Tracks Carried	Loading Specifications	Total Weight of Steel	Cost Per Lb. in Place Incl. False Work	Year Erected	Cond. Per Cent	DECKING WITH GUARD RAIL (If Metal Guard Used State Kind and Size)				Total Cost Superstructure
											Kind	Cost Per Lin. Ft. in Place	Year Built	Cond. Per Cent	

FORM 5B

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

PILE BRIDGES AND TIMBER TRESTLES

Include overhead bridges erected at expense of Railroad Company, and identify as such

Show joint structures separately and indicate division of ownership

Name of Road: ....

Limits ....

Railroad Valuation of June 30 ....

.... Compiler

Date ....

Location	Bridge Number	State if New, Rebuilt, Extended or Shortened	Kind	Total Length	Average Height to B. of R.	No. of Tracks Carried	Total No. of Bents	No. of Frame Bents	No. of Piles or Posts Per Bent	State if Decks are Solid, Ballasted or Special Construction	Year Built	Cond. Per Cent	Total Cost Per Lin. Foot of Bridge in Place

Location	Bridge Number	PILING						Dimensions of Caps	STRINGERS		TIES		GUARD RAIL		Total Feet B. M. Framed Timber	Cost Per M Ft. B. M. Timber in Place
		Kind	Lineal Feet	Cost Per Ft. in Place	Kind	Lineal Feet	Cost Per Ft. in Place		Dimensions	No. Per Span	No.	Dimensions	Dimensions of Timber Rail	Lin. Feet and Size of Metal Rail		

Size of sheet $8\frac{1}{2}'' \times 14''$

FORM 8

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

FROGS, SWITCHES AND RAILROAD CROSSINGS

Show items for each track, main and sidings, separately
Show joint tracks separately and indicate division of ownership

Name of Road: ....

Limits ....

Railroad Valuation of June 30 ....

.... Compiler

Date ....

Location	Weight of Rail	SWITCHES			Kind of Stand	Kind of Lamp	FROGS				GUARD RAILS			Cost of Complete Switch in Place	Cond. Per Cent
		No.	Kind	Length of Points			No.	Kind	Spread	Length	Weight of Rail	No.	Length		

Location	Weight of Rail	RAILROAD CROSSINGS								DERAILS				
		Angle of Crossing	Length of Crossing	Type	Railroad Crossed	Per Cent of Cost Paid by this Co.	Per Cent of Maint. Paid by this Co.	Total Cost of Crossing Installed	Cond. Per Cent	No	Kind	Weight of Rail	Total Cost Installed	Cond. Per Cent

FORM 9

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

TRACK FASTENINGS AND OTHER MATERIAL

Show items for each track, main and sidings, separately
Show joint track separately and indicate division of ownership

Name of Road: ....

Limits ....

Railroad Valuation of June 30 ....

.... Compiler

Date ....

Location	Lineal Feet of Track	Weight of Rail	SPLICE BARS						BASE PLATES			BOLTS			NUTLOCKS		
			Kind	Number of Pairs	No. of Holes Per Bar	Weight Per Pair	Price Per Pair	Cond Per Cent	No.	Weight Ea. in Lbs.	Price Each	Size	No. of 200 Lb. Kegs	Price Per Keg	Kind and Size	No. Boxes of 1000	Price Per Box

Location	Lineal Feet of Track	Weight of Rail	SPIKES			TIE PLATES			RAIL BRACES			BUMPING POSTS				GUARD RAIL (On Curves and in Tunnels)	
			Size	No. of 200 Lb. Kegs	Price Per Keg	Number	Weight Each	Price Each	Number	Weight Each	Price Each	Number	Kind	Year Installed	Cost in Place	Weight Per Yd.	Lineal Feet of Rail

Size of sheet $8\frac{1}{2}'' \times 14''$

FORM 5C

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

CULVERTS

Name of Road: ....

Limits ....

Railroad Valuation of June 30 ....

.... Compiler

Date ....

Show joint structures separately and indicate division of ownership. In proper column give lbs. reinforcement in concrete, or weight of C. I. Pipe. State if vitrified pipe is Single Strength (S. S.) or Double Strength (D. S.) If cost of Cofferdam is included in price per cu. yd. Masonry, so state

Culvert Number	State if New, Rebuilt, Extended or Shortened	Kind of Opening Timber, Stone or Concrete Box or Arch. Pipe-Vitrified or C. I.	Size	Length Out to Out	Year Built	Cond. Per Cent	TIMBER		PILING		MASONRY			Lbs. Re-inforcem't Wt. C. I. Pipe Strength Vit. Pipe	Cofferdam Total Cost (See Note)	Total Cost of Opening
							Total Ft. B. M.	Cost Per M. in Place Incl. Excav.	Total Lin. Feet	Cost Per Lin. Foot in Place	Kind and Class	Cubic Yards	Price Per Cu. Yd. Incl. Excav.			

FORM 6

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

TIES

Name of Road: ....

Limits ....

Railroad Valuation of June 30 ....

.... Compiler

Date ....

Show each track, main and sidings, separately
Show ties in joint track separately and indicate division of ownership

Location	CROSS TIES (State if ties are treated)										SWITCH TIES AND R.R. CROSSING TIES, INCL. HEAD BLOCKS (Show proportion of ownership of reporting road)					
	Dimensions	Number Per Mile	Oak		Cedar		Other Ties			Ave. Cond. Per Cent	Switch or Crossing	Kind	Ft. B. M. Per Set	No. of Sets	Price Per M. F. & B. M. at Site	Ave. Cond. Per Cent
			Number	Price Ea. at Site	Number	Price Ea. at Site	Kind	Number	Price Ea. at Site							

FORM 7

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

RAILS AND MILEAGE

Name of Road: ....

Limits ....

Railroad Valuation of June 30 ....

.... Compiler

Date ....

Length of sidings to be head block to head block or to end of track
Show main tracks separate from spurs and sidings or yard tracks, leased lines, joint track with division of ownership

Location	Year Laid	TRACK MILES							RAIL—TRACK FEET						Remarks
		Total Mileage	First Main Track	Second Main Track	Third Main Track	Fourth Main Track	Spurs and Sidings	Yard Tracks	Weight of Rail Per Yard						
									......lbs.	......lbs.	......lbs.	......lbs.	......lbs.	......lbs.	

Size of sheet $8\frac{1}{2}'' \times 14''$

FORM 10-11

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

BALLAST, TRACKLAYING AND SURFACING

Show items for each track, main and sidings, separately
Show joint track separately and indicate division of ownership

Name of Road: ....

Limits ....

Railroad Valuation of June 30..............................

.... Compiler

Date ....

Location	Ballast								Lineal Feet Dirt Ballast or Full Surfaced Track	Tracklaying		
	Standard Quantity Per Mile	Material	Depth Under Tie	Width of Crown	Lineal Feet Track	Cu. Yds.	Cost Per Cu. Yd.			Location	Amount	Cost Per Mile Incl. Train Service and Skeleton Surfacing
							In Track	Alongside Track				

FORM 12

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

ROADWAY TOOLS

Name of Road: ....

Limits ....

Railroad Valuation of June 30..............................

.... Compiler

Date ....

Track Tools Assigned to Sections								Bridge Tools Assigned to Regular Crews								Remarks
Location	Cars				Tools			Location	Cars				Tools			
	Kind	No	Price	Cond. Per Cent	No. of Sets	Price Per Set	Cond Per Cent		Kind	No.	Price	Cond. Per Cent	No. of Sets	Price Per Set	Cond. Per Cent	

FORM 13

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

FENCING AND CATTLE GUARDS

Show fences shown under miscellaneous structures

Name of Road: ....

Limits ....

Railroad Valuation of June 30..............................

.... Compiler

Date ....

Location	Right of Way Fences							Gates				Cattle Guards				
	Material and Kind	Height	Length of Single Fence	No. of Posts Per Mile	No. of Boards, Plank or Wires Per Panel	Unit Cost in Place	Cond Per Cent	No.	Kind	Cost Each in Place	Cond Per Cent	Number Sets	Kind	Material	Cost Per Set in Place	Cond Per Cent

Size of sheet $8\frac{1}{2}'' \times 14''$

FORM 17A

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

PLATFORMS, WALKS, PAVING AND CURB

Show joint property separately and indicate division of ownership

Name of Road: ....

Limits..............................

Railroad Valuation of June 30..............................

.... Compiler

Date..............................

Location	PLATFORMS AND WALKS				PAVING				CURB					PARKING	
	Material and Kind	Square Ft.	Price Per Sq. Ft.	Cond. Per Cent	Material	Square Yds.	Price Per Sq. Yd.	Cond. Per Cent	Material and Thickness	Depth	Total Length	Price Per Ft.	Cond. Per Cent	Amount	Total Cost

FORM 14

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

CROSSINGS AND SIGNS

Show joint property separately and indicate division of ownership

Name of Road: ....

Limits..............................

Railroad Valuation of June 30..............................

.... Compiler

Date..............................

Location	PLANKING				PAVING				WATCH AND GATE HOUSES						ROADWAY SIGNS			
	No. Crossings	Total Ft. B. M.	Cost 1 M. Ft. B. M. in Place	Cond. Per Cent	Kind	Square Yards	Cost Per Sq. Yd.	Cond. Per Cent	No.	Material and Type Elev. or Surface	Size	Year Built	Cost Complete in Place	Cond. Per Cent	Kind	No.	Price Each in Place	Cond. Per Cent
															Mile Posts			
															Whistle Posts			
															Section Posts			
															Flanger Signs			
															Yard Limit			
															Station Mile			
															R. R. Crossing			
															Private Property			

Location	CROSSING GATES							CROSSING BELLS								Kind	No.	Price Each in Place	Cond. Per Cent
	No. of Installations	No. of Posts Per Inst	Type	Distance Posts to Pump	Year Installed	Total Cost in Place	Cond. Per Cent	No. of Bells	Maker and Type	Kind of Circuit	Length of Circuit	No. of Batteries	Year Installed	Total Cost in Place	Cond. Per Cent	Draw Bridge			
																Bridge Signs			
																Culvert Signs			
																County Line			
																Bridge Warning Tell Tales or Ticklers			
																Cost Per Mile			

Size of sheet $8\frac{1}{2}'' \times 14''$

FORM 15

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

INTERLOCKING PLANTS

Name of Road: ....

....

Limits..............................

Railroad Valuation of June 30..............................

.... Compiler

Date ....

Location	Designation of Plant	Name of Road Crossed	Per Cent of Construction Cost Paid by this Company	Per Cent of Maintenance Cost Paid by this Company	Per Cent of Operating Cost Paid by this Company	STYLE OF MACHINE		CAPACITY			Date Put in Service	Total Cost of Plant Including Derails, Timber and Concrete	Ave. Cond. Per Cent
						Manual or Power Operated	Name of Maker	Numbers of Levers					
								Work	Spare	Total			

FORM 15A

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

SIGNAL APPARATUS

Name of Road: ....

....

Limits..............................

Railroad Valuation of June 30..............................

.... Compiler

Date..............................

Location	TRAIN ORDER, MANUAL BLOCK OR AUTOMATIC BLOCK SIGNALS									DISTANT SWITCH SIGNALS				Date of Installation	Total Cost	Cond. Per Cent
	Kind	Type	No. of Signals	No. of Switch Instruments	No. of Indicators	Batteries		Length of Track Sections	Kind of Connection, Pole or Trunking	Type of Signal	No. of Signals	Operation, Mechanical or Electric	Distance from Switch in Feet			
	Automatic, Manual Contr. or Telegraph	Disc or Semaphore				Kind	No. of Cells									

Location	TOWER HOUSE						OTHER BUILDINGS					General Description of Generating Machinery
	Kind	Dimensions	Foundation	Year Built	Total Cost of Tower	Cond. Per Cent	Kind	No.	Dimensions	Total Cost	Cond. Per Cent	

Size of sheet $8\frac{1}{2}'' \times 14''$

FORM 17

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

STATION BUILDINGS & FIXTURES

Show joint property separately and indicate division of ownership

Name of Road: ....

Limits ....

Railroad Valuation of June 30.......

.... Compiler

Date ....

	BUILDING															FIXTURES AND EQUIPMENT	
Location	General Description No. of Stories, Basement, etc.	Material and Kind	Roof	Interior Finish	Plan Dimensions	Walls: Ave. Height	Walls: Thickness	Foundation: Kind	Foundation: Cu. Yds.	Heating	Plumbing	Lighting	Year Built	Total Cost	Cond. Per Cent	Total Cost	Cond. Per Cent

FORM 10

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

TELEGRAPH & TELEPHONE LINES

Report only such equipment as is owned in part or in whole

Name of Road: ....

Limits ....

Railroad Valuation of June 30.......

.... Compiler

Date ....

		TELEGRAPH LINES																		
			POLES		BRACKETS OR CROSS ARMS			WIRE		INSTRUMENTS			SWITCH BOARDS			BATTERY				
Owner	Line Between	Miles of Line	No. Per Mile	Size	No.	Size	No. of Pins	Kind and Size	No. of Str'ds	No. of Keys	No. of Sounders	No. of Relays	No.	Capacity	Make	Kind	No. of Cells	Year Built	Ave. Cond. Per Cent	Cost Per Mile of Line Complete

		TELEPHONE LINES																	
			POLES		BRACKETS OR CROSS ARMS			WIRE		INSTRUMENTS			SWITCH BOARDS						
Owner	Line Between	Miles of Line	No. Per Mile	Size	No.	Size	No. of Pins	Kind and Size	No. of Str'ds	No. of Keys	No. of Desk Sets	No. of Dispatching Sets	No.	Capacity in Lines	No. of Lines Connected	Magneto or Common Battery	No. of Cord Circuits	Make	Cost Per Mile of Line Complete

Size of sheet $8\frac{1}{2}'' \times 14''$

FORM 19

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

SHOP BUILDINGS & STRUCTURES

Note—Include Oil Houses, Sand Houses, Store Houses, Scrap Bins and Appurtenances, when directly connected with Shops and Engine Houses

Name of Road: ....

Limits ....

Railroad Valuation of June 30 ....

.... Compiler

Date ....

Location	Descriptive Name of Structure	Plan Dimensions	WALLS			FOUNDATION		Kind of Roof	Kind of Floor	Kind of Heating	Kind of Lighting	Year Built	Total Cost of Structure	Cond. Per Cent
			Material	Ave. Height	Thick-ness	Kind	Cu. Yds.							

FORM 18

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

GENERAL OFFICE BUILDINGS AND FIXTURES

Name of Road: ....

Limits ....

Railroad Valuation of June 30 ....

.... Compiler

Date ....

Location	BUILDING															FIXTURES AND EQUIPMENT	
	General Description No. of Stories, Basement, etc.	Material and Kind	Roof	Interior Finish	Plan Dimensions	Walls		Foundation		Heat-ing	Plumb-ing	Light-ing	Year Built	Total Cost	Cond. Per Cent	Total Cost	Cond. Per Cent
						Ave. Height	Thick-ness	Kind	Cu. Yds.								

Size of sheet $8\frac{1}{2}'' \times 14''$

FORM 19B

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

CINDER PITS

Name of Road: ....

Limits..

Railroad Valuation of June 30..

.... Compiler

Date..

Location	Single (S) Double (D)	Dimensions of Pit	Is Loading Track Depressed	WALLS		PAVING		DRAINAGE		Year Built	Total Cost of Pit	Cond. Per Cent	HOISTING AND CONVEYING APPARATUS				
				Kind	Cu. Yds.	Kind	Sq. Feet	Kind	Lineal Feet and Size				Description	Size	Year Built	Total Cost	Cond. Per Cent

FORM 19A

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

ENGINE HOUSES & TURNTABLES

Name of Road: ....

Limits..

Railroad Valuation of June 30..

.... Compiler

Date..

ENGINE HOUSES

Location	No. of Stalls	Depth of Stalls	No. of Fire Walls	Kind of Foundation	Walls			Kind of Heating	Kind of Roof	Kind of Lighting	Pits			Smoke Jacks		Year Built	Total Cost Complete	Cond. Per Cent
					Material	Ave. Height	Thickness				No.	Material	Dimensions	No.	Kind			

Location	TURNTABLE								TURNTABLE PIT								Total Cost of Table and Pit
	Material and Type	Length	Loading Capacity	Total Weight of Table	Turning Apparatus		Year Built	Cond. Per Cent	Center Foundation			Curbing			Kind of Paving	Kind of Drainage	
					Kind	Cost in Place			Material	Quantity	Unit Cost	Material	Quantity	Unit Cost			

Size of sheet $8\frac{1}{2}'' \times 14''$

FORM 20

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

SHOP MACHINERY AND TOOLS

Including Transmission

Name of Road: ....

Limits..

Railroad Valuation of June 30..

.... Compiler

Date ....

Article	No. of Articles	Maker	SIZE AND DESCRIPTION	Location in What Building	Year Built	Unit Value New	Cond. Per Cent		REMARKS

FORM 21

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

WATER STATIONS

Name of Road: ....

Limits..

Railroad Valuation of June 30..

.... Compiler

Date ....

	BOILERS AND GAS ENGINES					WIND MILL				PUMP					
Location	Kind	Type	Size	Year Installed	Total Cost Installed	Tower Height and Kind	Wheel Diam. and Kind	Year Built	Cost in Place	Kind	Size	Year Built	Cost in Place	Suction Pipe Length and Diam.	Discharge Length and Diam.

		PUMP HOUSE				WATER TANK					WATER CRANES						
Location	Source of Supply (If Well, Give Diam. and Depth.)	Material	Size	Year Built	Total Cost	Kind and Size of Tank	Kind and Height of Tower	Kind and Am't of Foundation	Year Built	Total Cost in Place	Kind	Diam. of Column	Year Installed	Supply Pipe Length and Diam.	Total Cost Incl. Pit and Piping	Total Cost of Station Installed	Ave. Cond. Per Cent of Station

Size of sheet $8\frac{1}{2}'' \times 14''$

FORM 22

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

FUEL STATIONS

Name of Road: ....

Limits ....

Railroad Valuation of June 30 ....

.... Compiler

Date ....

Location	Type of Chute or Crane, Etc.	DESCRIPTION OF BUILDING							APPROACH							
		Dimensions of Building	No. of Pockets	Total Capacity Tons	Foundation	Year Built	Total Cost of Building	Cond. Per Cent	Design and Material	No. of Tracks Carried	Total Length in Feet	Max. Height	Total Ft. B M. Framing	Year Built	Total Cost Approach	Cond. Per Cent

Location	HOISTING AND CONVEYING APPARATUS				REMARKS
	General Description of all Machinery and Appliances Including Tipple Cars, Buckets, Cranes, Elevators, Engines, Dumping and Weighing Appliances	Year Installed	Total Cost Installed	Cond. Per Cent	

FORM 23- 24

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

ELEVATORS AND WAREHOUSES

Name of Road: ....

Limits ....

Railroad Valuation of June 30 ....

.... Compiler

Date ....

Location	GRAIN ELEVATORS																
	No. of Stories	Plan Dimensions	Walls			Foundation		Kind of Roof	Kind of Floor	Kind of Heating	Kind of Lighting	Year Built	Total Cost of Building	Cond. Per Cent	Machinery and Equipment		
			Material	Ave. Height	Thick-ness	Kind	Quantity								Kind of Installation	Total Cost	Cond. Per Cent

Location	STORAGE WAREHOUSES																
	No. of Stories	Plan Dimensions	Walls			Foundation		Kind of Roof	Kind of Floor	Kind of Heating	Kind of Lighting	Year Built	Total Cost of Building	Cond. Per Cent	Machinery and Equipment		
			Material	Ave. Height	Thick-ness	Kind	Quantity								Kind of Installation	Total Cost	Cond. Per Cent

Size of sheet $8\frac{1}{2}'' \times 14''$

Name of Road................	FORM 25A JOINT ENGINEERING DEP'T WISCONSIN TAX AND RAILROAD COMMISSIONS	Valuation of June 30........
....		.... Compiler
Limits......................	ORE DOCKS	Date......................

Name and Number		Location
Owned by	Operated by	
Year Built	Name of Builder	Type
APPROACH—Length	Height—Begin	End
Piling—Kind	Total Lin. Ft.	Cost Per Ft. in Place
Framing—Kind	Total Ft. B. M	Cost Per M. in Place
Steel—Kind	Total Wt. in Lbs.	Coost Per Lb. in Place
DOCK PROPER—Length	Width of Deck	Height Water to Deck
Pockets—Number	Size	Capacity in Tons
Chutes—Kind	Size	Cost Each Installed
Piling—Kind	Total Lin. Ft.	Cost Per Ft. in Place
Framing—Kind	Total Ft. B. M.	Cost Per M. in Place
Steel and Iron	Total Wt. in Lbs.	Cost Per Lb. in Place
Dredging and Filling	Total Cu. Yds.	Cost Per Cu. Yd.
TOTAL COST OF DOCK AND APPROACH		Cond. Per Cent.

POWER AND MACHINERY GENERAL LIST AND DESCRIPTION	Year Installed	Total Cost	Cond. Per Cent

BUILDINGS (List each separately)

Descriptive Name Give No. of Stories, etc.	Kind	Roof	Dimensions	Foundation	Volume Cu. Ft.	Year Built	Total Cost	Cond. Per Cent

Size of sheet $8\frac{1}{2}'' \times 14''$

Name of Road.................. .... Limits..........................	FORM 25 JOINT ENGINEERING DEPT WISCONSIN TAX AND RAILROAD COMMISSIONS	Valuation of June 30........ .... Compiler Date..........................

DOCK & WHARF PROPERTY

Designation (Local name)		Location
Owned By	Operated By	
Year Built	Name of Builder	
No. of Feet of Water Frontage	No. of Sq. Ft. Dock.	
Piling		
Kind	Total lin. ft.	Cost per lin. ft. in Place.
Framing		
Kind	Total Ft. B. M.	Cost M Ft. B. M. in Place.
Floor		
Kind	Quantity	Unit Cost in Place.
Masonry		
Kind	Total Cu. Yds.	Cost per Cu. Yd.
Dredging		
Kind of Material	Total Cu. Yds.	Cost per Cu. Yd.
Filling		
Kind of Material	Total Cu. Yds.	Cost per Cu. Yd.
Elevating or Handling Machinery		
Description		
Year Installed	Total Cost Installed	Cond. %
Coffer Dam		
Kind	Size	Total Cost.
Total Cost Excl. of Site and Buildings		Ave. Cond. %

BUILDINGS (List each separately)

Descriptive Name Give No. of Stories, etc.	Kind	Roof	Dimensions	Foundation	Volume Cu. Ft.	Year Built	Total Cost	Cond. %

REMARKS:

Size of sheet $8\frac{1}{2}'' \times 14''$

FORM 28A

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

STOCK YARDS—TRACK AND STOCK SCALES

Name of Road: ....

Limits..

Railroad Valuation of June 30..

.... Compiler

Date ....

STOCK YARDS													
Location	No. of Pens	Fence			No. of Gates	No. of Loading Chutes	Size of Loading Platform	No. of Sq. Ft. Sheds	Paving		Year Built	Total Cost of Yard	Cond. Per Cent
		Lineal Feet	No. and Size Boards	c. to c. Posts					Kind	No. Sq. Ft.			

WATER SUPPLY					
Source (If Well, Give Diam. and Depth.)	Length and Diam. Piping	Size of Tank	Kind of Power	Total Cost of Supply	Cond. Per Cent

TRACK SCALES										
Location	Maker	Capacity in Tons	Dimensions of Platform	Foundation			Size and Length of Pit Drain	Year Built	Total Cost of Scale in Place	Cond. Per Cent
				Kind	Quantity	Total Cost				

STOCK SCALES					
Location	Capacity	Size of Platform	Size of Scale House	Total Cost in Place	Year Built

FORM 28

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

MISCELLANEOUS STRUCTURES

Name of Road: ....

Limits..

Railroad Valuation of June 30..

.... Compiler

Date ....

Location	DESCRIPTION OF BUILDINGS	No. of Stories	Plan Dimensions	Ave. Height	MATERIAL			Year Built	Total Cost of Structure	Cond. Per Cent
					Foundation	Walls	Roof and Framing			

SNOW FENCE							
Location	Permanent or Portable	Length Lin. Ft.	Length of Panel	Height	No. and Size of Boards Per Panel	Cost Per Lin. Ft.	Cond. Per Cent

OTHER MISCELLANEOUS ITEMS			
Location	Description	Cost in Place	Cond. Per Cent

Size of sheet $8\frac{1}{2}'' \times 14''$

7-23-10—1 M

Name of Road: ....

Limits..

FORM 31

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

LOCOMOTIVES

Show intra-state and inter-state locomotives separately

Railroad Valuation of June 30............................

.... Compiler

Date..

Engine No.	Name of Builder	Year Built	Simple or Comp.	Pass. Fr't Sw. or Work	Cyl. Diam.	Type of Valve Gear	BOILER			No. of Truck Wheels	No. of Driving Wheels	Trail. Wheels Yes or No.	Weight of Eng. Loaded	TENDER		Total Wt. Eng. and Tender Loaded	Tractive Power	Head Light	When Given General Repairs	Cond. Per Cent	Unit Value New	Remarks
							Diam.	Sq. Ft. Heating Surface	Working Pressure					Water Capacity	Coal Capacity							

7-22-10—1 M

Name of Road: ....

Limits..

FORM 32

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

PASSENGER TRAIN CARS

Railroad Valuation of June 30............................

.... Compiler

Date..

Serial Number	Kind of Equip'	Class	Inside Dimensions	MATERIAL			Interior Finish	No. of Seats	TRUCKS				Kind of Heat	Kind of Light	Name of Builder	No. in Serv.	Year Built	Cond. Per Cent	Unit Value New		Remarks
				Under Frame	Body	Design of Vestibule			No. of Wheels	Mat. of Wheels and Tires	Mat. in Transoms	Mat. in Bolster									

7-22-10—1 M

Name of Roads ....

Limits..

FORM 33

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

FREIGHT TRAIN CARS

State if Gondola Cars are plain, drop or hopper bottom, if Stock Cars are double decked, if Box Cars are ventilated

Railroad Valuation of June 30............................

.... Compiler

Date..

Serial Number	Kind of Equipment as Box, Stock, Gondola, etc.	Capacity in Thous'ds	Dimensions Inside L x B x Ht.	MATERIAL			MATERIAL OF TRUCKS			Size of Air Brake Equipment	Name of Builder	No. of Series in Service	Year Built	Cond. Per Cent	Unit Value New		Remarks (See Note)
				Center Sills	Under Frame	Body	Wheels and Tires	Transoms	Bolster								

Size of sheet $8\frac{1}{2}'' \times 14''$

FORM 00
JOINT ENGINEERING DEP'T
WISCONSIN TAX AND RAILROAD COMMISSIONS

BLANKET FORM

Use this form for reporting all items not covered by other forms or for supplementing information given on any other form

Name of Road: ....

Limits ....

Railroad Valuation of June 30 ....

.... Compiler

Date ....

Location	GENERAL DESCRIPTION AND ITEMIZATION	Total Cost	Cond. %

7-22-10—1 M

FORM 34
JOINT ENGINEERING DEP'T
WISCONSIN TAX AND RAILROAD COMMISSIONS

MISCELLANEOUS EQUIPMENT

Give full description and percent condition of snow plows, steam shovels, dredges, pile drivers, wrecking cars, motor cars, etc.

Name of Road: ....

Limits ....

Railroad Valuation of June 30 ....

.... Compiler

Date ....

Article	No. of Articles	Maker	SIZE AND DESCRIPTION	Year Built	Unit Value New	Cond. Per Cent		Remarks

Size of sheet $8\frac{1}{2}'' \times 14''$

12-8-09-5M.

FORM 100

JOINT ENGINEERING DEPT.

WISCONSIN TAX AND RAILROAD COMMISSIONS

Physical Valuation of Railroads June 30, ...

SECTION VALUATION SHEET

Name of Road ....

Section ....

Location ....

Sheet No. ....

Compiled by ....

Date of Compilation ....

Checked by ....

		GENERAL DESCRIPTION AND ITEMIZATION	Cost of Reproduction New	Condition Per Cent	Present Value

Size of sheet 17″ × 14″

7-62-10—1 M

FORM 37

JOINT ENGINEERING DEP'T

WISCONSIN TAX AND RAILROAD COMMISSIONS

Name of Road: ....

Limits ....

STORES, SUPPLIES

—AND—

MATERIAL IN STOCK

Note—Give full description and value of stores, supplies, fuel, material, etc., for use in Wisconsin

Railroad Valuation of June 30.....

.... Compiler

Date ....

LOCATION	DESCRIPTION	Number or Quantity	COST		Cond. Per Cent	REMARKS
			Unit	Total		

Size of sheet $8\frac{1}{2}'' \times 14''$

Opinions and Court Decisions on Railroad Valuation. — There are numerous decisions of the courts on railroad valuation, some of which have been used in this book in the general discussion of values; others, considered most important, follow.

Professor H. C. Adams, statistician of the Interstate Commerce Commission, suggests some limitations and restrictions to the term "value" in Bulletin No. 21 of the "Bureau of Census," as follows:

> "The valuation submitted in this report may be properly defined as the commercial value of property used by railways in connection with the business of transportation. By 'commercial value' is meant the estimate placed upon the worth of property regarded as a business proposition. This must, of course, be the market estimate and not the arbitrary estimate of a public official. The two fundamental considerations by which the market is influenced in placing a value upon property when bought or sold are the expectation of income arising from the use of the property, and the strategic significance of the property. These two considerations are made the basis of the valuation of railway property submitted in this report. The material made use of in this valuation is, first, the operating and financial accounts of the railways; second, interrailway contracts and agreements; and, third, the published records of the stock market."

San Diego Land and Town Co. *v.* City of National City, 19 Sup. Ct. 810.

> "After observing that this broad proposition involved a misconception of the relations between the public and a railroad corporation, that such a corporation was created for public purposes, and performed

a function of the State, and that its right to exercise the power of eminent domain, and to charge tolls, was given primarily for the benefit of the public, this court said: 'It cannot, therefore, be admitted that a railroad corporation maintaining a highway under the authority of the State may fix its rates with a view solely to its own interests, and ignore the rights of the public. But the rights of the public would be ignored if rates for the transportation of persons or property on a railroad are exacted without reference to the fair value of the property used for the public, or the fair value of the services rendered, but in order simply that the corporation may meet operating expenses, pay the interest on its obligations, and declare a dividend to stockholders. If a railroad corporation has bonded its property for an amount that exceeds its fair value, or if its capitalization is largely fictitious, it may not impose upon the public the burden of such increased rates as may be required for the purpose of realizing profits upon such excessive valuation or fictitious capitalization; and the apparent value of the property and franchises used by the corporation, as represented by its stocks, bonds, and obligations, is not alone to be considered when determining the rates that may reasonably be charged.'" (169 U. S. 544, 18 Sup. Ct. 433.)

"The true value of a line of railroad is something more than an aggregation of the values of the separate parts of it, operated separately. It is the aggregate of those values plus that arising from a connected operation of the whole, and each part of the road contributes not merely the value arising from its independent operation, but its mileage proportion of that flowing from a continuous and connected operation of the whole. . . . The value of the property results from the use to which it is put, and varies with the profitableness of that use, past, present and prospective, actual and anticipated. There is no pecuniary value outside that which results from such use.

"In the nature of things it is practically impossible, at least in respect to railroad property, to divide its value and determine how much is caused by one use to which it is put and how much by another. Take the case before us, it is impossible to disintegrate the value of that portion of the road within the State of Indiana and determine how much of that value springs from its use in doing interstate business and how much from its use in doing business wholly within the State. An attempt to do so would be entering upon a mere field of uncertainty and speculation." (154 U. S. Sup. Ct. 444.)

"It was also said that 'the basis of all calculation as to the reasonableness of rates to be charged by a corporation maintaining a highway under legislative sanction must be the fair value of the property used by it for the convenience of the public. And, in order to ascertain that value, the original cost of construction, the amount expended in permanent improvements, the amount and market value of its bonds and

stock, the present as compared with the original cost of construction, the probable earning capacity of the property under particular rates prescribed by statute, and the sum required to meet operating expenses, are all matters for consideration, and are to be given such weight as may be just and right in each case. We do not say that there may not be other matters to be regarded in estimating the value of the property. What the company is entitled to ask is a fair return upon the value of that which it employs for the public convenience. On the other hand, what the public is entitled to demand is that no more be exacted from it for the use of a public highway than the services rendered by it are reasonably worth.' " (169 U. S. 546, 18 Sup. Ct. 434.)

Valuation of Street Railways. — Although there are a few horse railways still in existence, particularly in New York City, no forms will be given here for a summary of their value, as they are almost completely out of date and long since have been superseded by electrically operated roads. As the forms of report for street railways differ somewhat in that of the Interstate Commerce Commission, the Massachusetts Railroad Commission, and the New York Public Service Commission, and, as the summary for an appraisal is not necessarily like that for construction accounts as carried on the company's books, it is as well to adopt a summary that is short, definite and complete. Such a summary is shown on the next page. Attention is called to the arrangement. All items subject to a percentage increase for Engineering, Contingencies, etc., are grouped together under the numbers 1 to 7. They are thus summarized and the percentage for engineering and contingencies that has been assumed is applied to the total. The items 11–12, 13–14, being purchased constantly in the course of business, should carry no percentage on their amounts. Item No. 15 — "Paving" — is always a doubtful charge, sometimes having been laid by the city and again by the company. It is always a matter for discussion as to whether "Paving" belongs to the company or to the city. At least, it should have no percentage charged to it, and it is therefore placed in the summary with the other items which carry no percentage. Land is another item against which there is no percentage charge. Commissions for its purchase are invariably charged to the seller, and not to the buyer. Any preliminary expenses going toward looking it up, etc., must be chargeable in the promotion or intangible values. Following is the form.

Form of Summary for Use in the Appraisal of Electric Railway

	Cost of Reproduction New	Present Value
1. Roadbed and Track		
2. Electrical distribution		
3. Buildings and structures		
4. Power plant equipment		
5. Shop equipment		
6. Rolling stock and equipment		
7. Miscellaneous		
8. Total of items 1 to 7		
9. Add percentage		
10. Total of items, 8 and 9		
11. Office furniture and fixtures		
12. Tools and equipment		
13. Horses, wagon and harness		
14. Stores and supplies		
15. Paving		
16. Land		
17. Total of items 11 to 16		
Grand total value, items 10 and 17 . . .		

Many of the forms shown in connection with the chapter on Railroad Valuations can be used for Street Railway Appraisal as well. Forms for use with evaluation of buildings, power plant, etc., will be found in other chapters.

Information Required in the Valuation of a Street Railway Property. — Much of the information required for the appraisal of a street railway property can be collected on forms similar to those used in the appraisal of railroads, but in order that a proper arrangement may be effected and that all items may be included, the following list is suggested. It is one that has been used by the writer in some extensive work and should include practically all items upon which information is required.

Track:

Mileage of main track, second track, third track, special work and sidings. List by divisions, list by streets, alphabetically arranged.

Length of each type of rail or track and location of same.

Details of joints.
Drawings of types of rails.
Drawings of bridges and changes in same.
Drawings of types of construction.
Culverts; drawings of same, and cost.
Right of way.
Track signals; drawings of layout.
Sewers and catch basins; drawings of same.

Special Work:
Drawings of layouts in each case.
Schedule of each class of.
Cost sheet of each.

Ties:
Size, kind of wood; metal; set in concrete or other material.
Distance apart.
Kind and depth.
Ballast; kind and depth.

Paving:
List of different styles, and type and location of same.
Cost sheet of each style and type, showing foundation, etc.
Paving in and about Special Work.

Track Bonding:
What number and size, and style of bond at each joint.
Style and cost of bonds around special work.
Cross bonding, size and distance apart.

Overhead Trolley:
Length and size of trolley wire, and how suspended.
Number and style of poles and whether of wood or iron; Guy poles and stubs.
Painting of poles; number of coats.
List of all fastenings on poles, span wires, etc.
List of all overhead switches, crossings, etc.
List of span wire, giving length and size.
Cost of erection.
Side bracket construction; number of brackets, style.

Power Houses:
(Buildings.)
(Land.)
Chimneys.

Economizers.
Boilers.
Pumps, feed.
Piping of all kinds.
Heaters.
Coal and ash handling machinery.
Engines.
Condensers; circulating and air pumps.
Generators.
Boosters.
Switchboards complete.
Connections between generators, etc., and switchboards.
Copper from switchboard to outside line of building.

Battery Stations:
(Land and building placed.)
Battery, number and size, and make of cells complete.
Booster.
Switchboards.
Tools and miscellaneous.

Repair Shops:
(Land and building placed.)

Machine shop	Glazing shop	Tin shop
Blacksmith shop	Winding shop	Lumber yard
Carpenter shop	Upholstering shop	Casting yard
Pattern shop	Cabinet shop	Scrap yard
Truck shop	Gear store	Wheel shop
Paint shop	Store room	Offices

Feeders:
Length of each feeder, giving size.
Number of insulators, etc., type and size.
Cross arms; type, number of pins, size.
Equalizers, with their switchboards.
Return feeders; material, insulated or not.
Lead-covered cables; length, size.
Cable; concrete covering, including ditch, etc.

Conduit:
Map of, showing length between manholes.
Number and size of ducts and depth.

Type of conduit.
Number and size of manholes; whether brick or concrete.
Number and size of pole connections from manholes.
Cable supports in manholes; number, size and style.

Car Barns:

(Land and buildings placed.)
Track in barn and outside of same, in yard.
Special work.
Pits.
Air compressor and storage.
Equalizer board.
Inside lighting.
Outside lighting.
Overhead trolley.
Overhead switches and special work.
Feeders to barn and track.
Snow plows, boards.

Rolling Stock:

Revenue Cars —

Photo of each type; floor plan of each type.
Type; size and number of each, number on each.
Trucks; number of each, make and size.
Wheels cast iron; diameter and weight.
Wheels steel; diameter and weight of.
Electric motors; make, style, size, gears and ratio of same.
Controllers; make, type and number of each.
Other electrical equipments; including circuit breakers, lighting and head light.
Signs and lamps.
Air equipment for brakes.

Construction Cars —

Photo of each type; floor plan of each type.
Number; size, type, number of each.
Trucks, make and number of each.
Electric motors; make, style, size and number of gears and ratio.
Controllers; make, type, and number of each.
Other electrical equipment.
Air equipment for brakes.

In studying the history of a street railway property, it is likely to be discovered that it consists of two or more merged properties, records of the early cost of which will be lacking in one or more of the separate members of the system.

In order that all the members may be included in the valuation of both tangible and intangible properties, it is common to lay out a schedule of items, and the following list, taken from a paper entitled "Valuation of Tangible and Intangible Property," by Frank R. Ford in the *Annals of the American Academy of Political and Social Science*, for January, 1911, has been carefully worked up by him in connection with the appraisal of properties in New York City. The only fault, if any, that might be found with the list is that it is a little too carefully worked out, and as the author says "it may be questioned whether a number of the above items should appear in the capitalization of the enterprise. In many cases they have been charged against early income or later profit and loss." This list simply shows about all the items that may be looked for in a valuation of a street railway.

Tangible Property

"The physical, or tangible, property includes land, construction, equipment and cash, or its equivalent. If these items are being valued on the basis of either the original cost or the cost of reproduction, they should include the cost of acquiring land, the cost of supervision and administration of the construction by the general contractor, the subcontractors, the engineers and the company's executive organization. In other words, all labor and expense going to make up the construction of the finished whole should be included, whether this labor be that of day laborers, foremen, superintendents, contractors, engineers or officers and employees of the company. The expenses of such contruction work should also include all contingent expenses in connection with such labor, together with such items as interest and taxes during construction, and other overhead charges. In some cases the cost of acquiring land, the administration of construction work by the company's organization, the general contractor's services, engineering expenses and interest and taxes during construction have been considered as intangible property, this distinction being due, presumably, to the fact that in estimates of cost of reconstruction these items have been arrived at by the use of round percentages. Such labor and expense, however, are essential features of the cost of construction and equipment, and consequently belong, strictly speaking, to the tangible property. Stock, tools, supplies and working capital, in whatever form it exists, are also part of the tangible property.

A list of the principal items which enter into the cost of production of the tangible, or physical, property comprises the following:

Work and Expense Items Forming the Tangible Property of a Street Railway

I. Company's overhead charges upon construction.
  1. Executive organization's work and expenses, including:
    a. Accounting expenses.
    b. Office expenses.
    c. Storeroom and stable expenses.
    d. Permits of authorities and city inspection.
  2. Legal work and expenses.
  3. Technical work and expenses.
    a. Company's engineering organization.
    b. Consulting engineers.
    c. Architects.
    d. Testing and outside inspection.
  4. Interest during construction.
  5. Taxes during construction.
  6. Wear and tear during construction.

II. Land, including private right of way and sites for power houses, car barns, shops, terminals, etc.
  1. Assessed value.
  2. Additional market value for ordinary purposes.
  3. Additional value for railroad purposes, including:
    a. Plottage.
    b. Contiguity factor.
    c. Special value for railroad purposes due to location.
  4. Overhead charges for acquisition of land, such as:
    a. Brokerage.
    b. Legal work and expenses.
    c. Technical work and expenses.
    d. Title insurance.
    e. Loss on portion of site not necessary.
    f. Loss of buildings discarded.

III. General contractor's overhead charges and profits.
  1. Work and expenses of contractor's general organization and office.
  2. General superintendence, watching and lights.
  3. Fire, accident and liability insurance during construction.
  4. Maintenance and use of tools.
  5. General contractor's profits.

IV. Material and labor, comprising the physical construction and equipment, as furnished by the subcontractors.
  1. Inventory, prices on basis of subcontracts.
  2. Extras, incidentals and contingencies.

V. Stock, tools and supplies.
  1. Inventory, priced.
  2. Incidentals.

VI. Working capital, including:
  1. Cash on hand.
  2. Accounts and bills receivable.
  3. Prepaid accounts.
  4. Land and buildings not used in operation.

Intangible Property

All of the remainder of the corporation's property should be considered as intangible property.

From the standpoint of value, the intangible property represents the total value of the company from a business standpoint, less the value of its physical property. From a standpoint of cost, either rst cost or cost of reproduction, the intangible property represents the cost of acquiring rights and capital for producing the tangible property and for placing the company in a potential position for doing business efficiently as a going concern.

Intangible Property from the Standpoint of Cost

From the standpoint of cost of production through the period of development, the intangible property will include many, or all, of the following items:

Work and Expense Items through the Period of Development Forming the Intangible Property of a Street Railway

I. Promotion of the enterprise.
  1. Work and expenses of promoter's organization.
  2. Preliminary legal work and expenses.
  3. Preliminary technical work and expenses.
    a. Survey and location of line.
    b. Estimates of construction cost and of income and expenses.
    c. Preparation of prospectus.
  4. Profits of promotion.

II. Corporate organization.
  1. Legal work and expenses.
    a. Incorporation.

- *b.* Details of perfecting legal organization.
- *c.* Form of securities.
- *d.* Mortgages.

2. Executive organization's work and expenses.
   - *a.* Directors', officers' and employees' work and expenses (until commencement of construction).
   - *b.* Office and general expenses (until commencement of construction).
   - *c.* Engraving securities.
   - *d.* Registration and certification of securities.

III. Franchises and consents (often under conditions of competition).

1. Property owners' options and consents (for location and for change of motive power).
   - *a.* Executive organization's work and expenses.
   - *b.* Legal work and expenses (vacations of injunctions, etc.).
   - *c.* Technical work and expenses (surveys, maps, etc.).
   - *d.* Payments for consents.
2. Franchises and consents of municipal authorities (including municipal legislature, mayor, borough presidents, commissioners of bridges, parks, docks, highways, water supply, sewers, etc.).
   - *a.* Executive organization's work and expenses.
   - *b.* Legal work and expenses.
   - *c.* Technical work and expenses.
   - *d.* Payments for franchises.
     - A. Lump sum.
     - B. Capital expenditures under governmental requirements for property, the title of which does not vest in the company, such as:
       1. Grading and widening streets.
       2. Removing subsurface street obstructions.
       3. Paving.
       4. Track and overhead line constructed on municipal property, such as parks and bridges.
       5. Change of location of tract or line, due to governmental requirements.
3. Consent of state utilities commission.
   - *a.* Executive organization's work and expenses of presenting project.
   - *b.* Legal work and expenses.
   - *c.* Technical work and expenses.

4. Trackage, pole and other agreements with other public utility corporations.
    - *a.* Executive organization's work and expenses.
    - *b.* Legal work and expenses.
    - *c.* Technical work and expenses.

IV. Development of technical standards.

1. Past supersession and obsolescence, caused by:
    - *a.* Changes in the art, and experiments, such as:
        - A. Stagecoaches.
        - B. Horse-car system.
        - C. Cable system.
        - D. Storage battery system.
        - E. Compressed air system.
        - F. Underground contact systems.
        - G. Gasoline motor system.
    - *b.* Improvements in the art, such as:
        - A. Large double-truck cars in place of small single-truck cars.
        - B. Introduction of prepayment and safety devices on cars.
        - C. Improved electric motors.
        - D. Improvement of grade and alignment of track.
        - E. Standardization of gauge.
        - F. Replacement of single track with double track.
        - G. Heavier rails of improved design.
        - H. Improved paving and foundation.
        - I. Steel instead of wooden poles.
        - J. Placing electrical conductors underground.
        - K. Fireproofing barns, shops and power houses.
        - L. Replacing small belted and direct-connected engine units with large steam turbines and other power-house improvements.
        - M. Alternating-current distribution, permitting power development from one large plant, in place of direct-current distribution from several small plants.
2. Piecemeal construction.
3. Extra cost of construction, due to non-interference with operation.
4. Solidification of roadbed.
5. Adaptation of construction and equipment.

V. Development of company's business.

1. Losses of early operation.

2. Losses of outlying sections of line.
3. Perfection of executive organization and business methods.
4. Development of park amusement enterprises.

VI. Consolidation with and control of other corporations.
1. Corporate consolidation.
   a. Executive organization's work and expenses.
   b. Legal work and expenses.
   c. Payments to state or city.
   d. Payments for securities.
   e. Tangible or intangible property of merged corporation which is superseded by consolidation.
2. Leases of other corporations.
   a. Executive organization's work and expenses.
   b. Legal work and expenses.
   c. Payments to state or city.
3. Investments in securities of other corporations.

VII. Financing.
1. Work and expenses of promoter and associates in negotiation and underwriting.
   a. Preliminary promotion syndicate or association.
   b. Stock underwriting syndicate.
   c. Bond underwriting syndicate.
2. Sale of securities.
   a. Permission for issue from state, state commission or municipal authorities.
      A. Executive organization's work and expenses.
      B. Legal work and expenses.
      C. Technical work and expenses.
   b. Financial negotiations.
      A. Executive organization's work and expenses.
      B. Legal work and expenses.
      C. Technical work and expenses.
   c. Payments of commissions to bankers and brokers, representing their work, expenses and profits.
   d. Discounts on securities.

VIII. Patents and licenses.
1. Development of inventions.
2. Purchase of patents or licenses.

IX. Interest on work and expense items of intangible property until commencement of operation."

Valuation of a Power Plant with Forms. — A power plant is included with both street railways and electric lighting, but being

a very important item, is considered here as a separate subject. Buildings and land are treated under separate headings elsewhere, leaving only the operating plant itself to be covered.

The copies of the following named forms will be found on pages 96 to 105 inclusive. These forms are the ones which have been devised by the Joint Engineering Department of the Wisconsin Commission, and they have been well worked out and improved from time to time, but must be taken as tentative only and subject to additional improvements at any time.

Power Plant Equipment, Field Inventory:

Boilers.
Boiler feed and auxiliaries.
Engines and condensers.
Generators, motors, etc.
Switchboards.
Storage batteries.
Transformers.
Miscellaneous electrical apparatus.
Miscellaneous.
Detailed summary.

The footnote on the first form refers to a table of "condition per cent," which will be found under the subject of depreciation, where the whole matter is described.

The form for use in assembling the total value of a steam power plant will be found on page 106. The items for this summary can be taken from the preceding forms.

W. B. A. Form 554

Sheet No.................

..................Inspector

Date ....

POWER PLANT EQUIPMENT — FIELD INVENTORY

BOILERS

PUT NOTHING IN THIS SPACE

Company ....
Name of Plant..........
City..........
Name of Maker..........
Type of Boiler ....
Total Weight of Metal..........
Number of Boilers of this Type and Size..........
If Fire Tube, Type of Front ....
Dimension of Shell ....
Thickness of Shell..........
Thickness of Head ....
Classification of Service..........
Station Designation No. ....
Location in Plant ....
Maker's Designation and No...........
No. and Size of Tubes ....
No. Type and Size of Flues..........
Size of Feed Pipe..........
Size of Steam Pipe ....
Size of Blow Off Pipe..........
Size of Dome or Steam Drum..........
Heating Surface Area Sq. Ft. ....
Number and Size of Drums..........
....
Stoker or Hand Fired..........
Grate, Kind ....
Area Sq. Ft...........
Nominal Horse Power ....

Size of sheet $8\frac{1}{2}'' \times 11''$

Overload Capacity ....
Superheat at Boiler..........
Superheat at Engine..........
How Often Cleaned ....
Chrracter of Scale..........
Type and Dimensions of Foundations ....
....
Method of Support, Type and Dimensions of Setting..........
....
....
When Last Inspected..........
Inspector's Report ....
....
What Repairs and When..........
....
Type of Safety Valve..........
Pressure Set for..........
How Tested and When ....
Operated ?..........
In Operating Condition ? ....
* Maintained G., F. or P...........
Date Installed...........Age..........
Previous History, if any..........
....
See Picture No...........
Additional information. If in field book give
No.......Page ....
....

* (Good, Fair, Poor) "G" represents best maintenance in that item is depreciated for age only; "F" is 90 per cent and "P" 80 per cent of condition "G." If space for an item is not sufficient mark "over" and continue on back of sheet.

W. B. A. Form 555

POWER PLANT EQUIPMENT — FIELD INVENTORY

BOILER FEED AND AUXILIARIES

Sheet No.................
..................Inspector
Date....................

PUT NOTHING IN THIS SPACE

Company ....
Name of Plant ....
City ....
Source of Water Supply ....
Character of Water Supply ....
Compound Used ....
Purifier ....
Open or Closed Heater ....
Size and Weight of Purifier or Heater ....
Name of Maker ....
Number of this Type and Size ....
Classification of Service ....
Station Designation No. ....
Location in Plant ....
Maker's Designation No. ....
Capacity of Purifier or Heater ....
Operated? ....
In Operating Condition? ....
*Maintained G., F. or P. ....
Date Installed..................Age........................
Previous History, if any ....
....
Name of Injector ....
Number of this Type and Size ....
Type and Serial No. ....
Size Injector ....
Capacity ....
Temp. of Feed ....
Size of Water Supply ....
Size of Water Discharge ....
Size of Steam ....
Operated? ....
In Operating Condition? ....
*Maintained G., F. or P. ....
Date Installed..................Age........................

Size of sheet $8\frac{1}{2}'' \times 11''$

Name of Stoker ....
Number of this Type and Size ....
No. of Stokers to Boiler ....
Location ....
Type and Weight of Stoker ....
Name of Fan ....
Type, Dimensions and Speed ....
No. of this Type and Size ....
No. of Stokers connected to Fan ....
Method of Drive ....
Motor, Engine or Pulley Data ....
Operated? ....
In Operating Condition? ....
*Maintained G., F. or P. ....
Date Installed..................Age........................
Kind of Coal Used ....
Rate of Combustion ....
How Often Fire Cleaned ....
Coal Storage Capacity ....
Type of Bin ....
Coal and Ash Handling Machinery ....
Describe on back of sheet
Draft inches Water ....
Flue Gas Temper. Entering Stack ....
Economizer, Name ....
Number ....
Capacity and Dimensions ....
Total Weight ....
Operated? ....
In Operating Condition? ....
*Maintained G., F. or P ....
Date Installed..................Age........................
See Picture No. ....
Additional Information. If in field book give
No.........Page..

* (Good, Fair, Poor) "G" represents best maintenance in that item is depreciated for age only; "F" is 90 per cent and "P" 80 per cent of condition "G." If space for an item is not sufficient mark "over" and continue on back of sheet.

W. B. A. Form 553

Sheet No. ....
.... Inspector
Date ....

POWER PLANT EQUIPMENT — FIELD INVENTORY

ENGINES

PUT NOTHING IN THIS SPACE

Company ....
Name of Plant ....
City ....
Name of Maker ....
Type of Engine ....
Total Weight including Flywheel ....
Number of Engines of this Type and Size ....
Classification of Service ....
Station Designation No. ....
Location in Plant ....
Maker's Designation and No. ....
Cylinder Dimensions ....
Admission Pressure ....
Back Pressure ....
Size Steam Pipe ....
Size Exhaust Pipe ....
Speed ....
Nominal Horse Power ....
Overload Capacity ....
Diameter of Flywheel ....
Dimensions of Rim ....
Diameter of Separate Belt Wheel ....
Dimensions of Rim ....
Direct Connected or Belted to ....

Size of sheet $8\frac{1}{2}'' \times 11''$

Data of Driven Machine ....
Type of Governor ....
Type of Safety Stop ....
Has Governor a Synchronizing Attachment ....
What Repairs and Alterations and When ....
....
....
Peculiar Features of Engines ....
....
Method of Lubricating Engine ....
....
Trimmings ....
....
Operated? ....
In Operating Condition? ....
* Maintained G., F. or P. ....
Date Installed .... Age ....
Previous History, if any ....
....
See Picture No. ....
Additional Information. If in field book give
No. .... Page ....
Attach Indicator Card if available ....

* (Good, Fair, Poor) "G" represents best maintenance in that item is depreciated for age only; "F" is 90 per cent and "P" 80 per cent of Condition "G."
If space for an item is not sufficient, mark "over" and continue on back of sheet.

Form 548-A

JOINT ENGINEERING DEPARTMENT

SHEET NO.______

WISCONSIN TAX AND RAILROAD COMMISSIONS

Inspected by ________ Date___

Unit Cost Placed by___ Date___

Compiled by ________ Date___

Checked by ________ Date___

Power Plant Inventory

Generators, Motors, Etc.

Company ____________________________________

Including Generators, Motors, Motor-Generators, Frequency-Changers, Turbo-Generators, Rotary Convertors, Boosters, Brush Arc Machines and Miscellaneous Dynamos

Name of Plant........................City........................
Name of Article ....
Number of Articles...
Name of Maker ....
Date Installed..............................Age..................
Name Plate Data ....
....
....
Number of Poles...., RPM...., Frequency...., Phase...., Voltage....
Belted or Direct Connected to.................................
Shunt, Series, or Compound Wound..............................
Classification of Service.....................................
Station Designation Number ....
Location in Plant...
In Operating Condition ?................ Operated ?................
Maintained Good, Fair or Poor.................................
Previous History, if any ....
Additional Information..
....
....
....
.....................Size of sheet, $8\frac{1}{2}'' \times 11''$.....................
....
....
....

COST AND PRESENT VALUE

Am't Cost New f. o. b. factory	$......	
Freight	....	$
Installation and Cartage		
Unit Scrap		
Copper.......lb @....	....	
Iron..........lb @....		
Unit Wearing Value.........	....	$......

Life years..............................		
Total Wearing Value......	$......	
Condition %.............		
Total Residual Wearing Val.	$......	
Total Scrap Value.........		$
Total Present Value.......	....	
Total Cost New in Place...	....	

REMARKS: ....
....
....
....
....
....
....
....

APPORTIONMENT

To	Per Cent	Total: Cost New	Total: Present Value
....	....	$.........	$.........
....	....	....	....
....	....	....	....
....			
Total....	....	$.........	$.........

Form 552–A

JOINT ENGINEERING DEPARTMENT **SHEET NO.______**

WISCONSIN TAX AND RAILROAD COMMISSIONS

Power Plant Inventory

Switchboards

Inspected by________Date___

Unit Cost Placed by___Date___

Compiled by________Date___

Checked by________Date___

Company____

Including Instruments, Hand Switches, Hand and Remote Control Oil Switches, Relays, Circuit Breakers, and other Similar Accessory Apparatus and Construction

Name of Plant........................	City..............................
Name of Article	Station Designation No.............
Number of Articles....................	Location in Plant ....
Name of Maker	Operated ?.........................
Date Installed .... Age.......	In Operating Condition ....
Name Plate Data.	Maintained Good, Fair or Poor ......
Classification of Service	Previous History if any ....
....	....

SUMMARY	SKETCH OF PANEL
	Size of sheet $8\frac{1}{2}'' \times 11''$
$	

COST AND PRESENT VALUE

Am't Cost New f. o. b. factory	$......		Life years..............................		
Freight	....	$	Total Wearing Value......	$......	
Installation and Cartage			Condition %.............		
Unit Scrap			Total Residual Wearing Val.	$......	
Copper.......lb @....	....		Total Scrap Value.........		$
Iron.........lb @....			Total Present Value.......	....	
Unit Wearing Value.........	....	$......	Total Cost New in Place...	....	

REMARKS: ....
....
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....
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APPORTIONMENT

To	Per Cent	Total	
		Cost New	Present Value
....	....	$.........	$.........
....	....	....	....
....	....	....	....
....	....	....	....
Total....	....	$.........	$.........

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JOINT ENGINEERING DEPARTMENT

SHEET NO.______

WISCONSIN TAX AND RAILROAD COMMISSIONS

Inspected by________Date___

Unit Cost Placed by___Date___

Compiled by_______Date___

Checked by________Date___

Power Plant Inventory

Storage Batteries

Company______________________________________

Including Large Batteries used in conjunction with Generators, and small ones used for Oil Switches

Name of Plant....................City..............................
Name of Battery...
Number of Batteries...
Name of Maker...
Date Installed................Age...
Name Plate Data...
....
Classification of Service...
Station Designation No..
Location in Plant...
In Operating Condition ?..................Operated?......................
Maintained Good, Fair or Poor...
Number of Cells...
Type of Cell..
Glass or Wooden Cell..
Capacity in Ampere-hours (8 hr. Rate).....................................
Kind of System on which Battery operates..................................
Previous History, if any..
For method of Mounting Cell, see Field Book No...............page....
For End Cell Switches and Further Information, see Field Book No......
....page....
....
....

Size of sheet $8\frac{1}{2}'' \times 11''$

COST AND PRESENT VALUE

Am't Cost New f. o. b. factory	$......	
Freight	....	$
Installation and Cartage		
Unit Scrap		
Copper.......lb @....	....	
Iron.........lb @....	....	
Unit Wearing Value........	....	$......

Life years..............................		
Total Wearing Value......	$......	
Condition %.............		
Total Residual Wearing Val.	$......	
Total Scrap Value........		$
Total Present Value.......	....	
Total Cost New in Place...	....	

APPORTIONMENT

REMARKS: ....
....
....
....
....
....
....
....

To	Per Cent	Total	
		Cost New	Present Value
....	....	$.........	$.........
....	....	....	....
....	....	....	....
....			
Total....	....	$	$

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JOINT ENGINEERING DEPARTMENT

SHEET NO.______

WISCONSIN TAX AND RAILROAD COMMISSIONS

Inspected by_______Date___

Unit Cost Placed by___Date___

Compiled by_______Date___

Checked by_______Date___

Power Plant Inventory

Transformers

Company___________________________________

Including Arc Lighting, Transformers, Lighting Transformers in the Power Station, High Tension Transformers, AC Feeder Regulators, etc.

Name of Plant .... City ....
Name of Article ....
Number of Articles ....
Name of Maker ....
Date Installed .... Age ....
Name Plate Data ....
....
....
Classification of Service ....
Location in Plant ....
Operated ? ....
In Operating Condition ? ....
Maintained Good, Fair or Poor ....
Method of Cooling ....
Additional Information ....
....
....
....
....
......................Size of sheet $8\frac{1}{2}'' \times 11''$ ....
....
....
....

COST AND PRESENT VALUE

Am't Cost New f. o. b. factory	$......		Life years..............................			
Freight	....	$	Total Wearing Value......	$......		
Installation and Cartage			Condition %..............			
Unit Scrap			Total Residual Wearing Val.	$......		
Copper.......lb @....	....		Total Scrap Value.........		$	
Iron.........lb @....			Total Present Value.......	....		
Unit Wearing Value.........	....	$......	Total Cost New in Place...	....		

APPORTIONMENT

REMARKS: ....
....
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....

To	Per Cent	Total: Cost New	Total: Present Value
....	....	$.........	$.........
....	....	....	....
....	....	....	....
....	....	....	....
Total.....	....	$.........	$.........

549–A

JOINT ENGINEERING DEPARTMENT

SHEET NO.______

WISCONSIN TAX AND RAILROAD COMMISSIONS

Power Plant Inventory

Miscellaneous Elec. Apparatus

Company____________________________________

Inspected by_______Date___

Unit Cost Placed by___Date___

Compiled by_______Date___

Checked by_______Date___

Including Machine Leads, Conduits, Lighting Systems, Wiring for Cranes, Bus Bars, Bus Bar Fixtures, etc.

Name of Plant........................City....................
Name of Article..
Number of Articles...
Name of Maker..
Date Installed........................Age......................
Name Plate Data..
Classification of Service....................................
Location in Plant..
Operated?..
In Operating C ndition?......................................
Maintained Good, Fair or Poor................................
Additional Data..
....
....
....
....
....
....................Size of sheet $8\frac{1}{2}'' \times 11''$....................
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....
....

COST AND PRESENT VALUE

Am't Cost New f. o. b. factory	$......		Life years..............................		
Freight..............	....	$	Total Wearing Value......	$......	
Installation and Cartage			Condition %.............		
Unit Scrap			Total Residual Wearing Val.	$......	
Copper.......lb @....	....		Total Scrap Value.........		$
Iron.........lb @....			Total Present Value.......	....	
Unit Wearing Value........	....	$......	Total Cost New in Place...	....	

Remarks: ....
....
....
....
....
....
....
....

APPORTIONMENT

To	Per Cent	Total	
		Cost New	Present Value
....	....	$..........	$..........
....	....	....	....
....	....	....	....
....	....	....	....
....			
Total....	....	$..........	$..........

W. B. A. FORM 559

Company ________________ Sheet No. ________________

Name of Plant ________________ ________________ Inspector

City ________________ Date ________________

POWER PLANT EQUIPMENT — FIELD INVENTORY

Miscellaneous

Size of sheet $8\frac{1}{2}'' \times 11''$

PUT NOTHING IN THIS SPACE

Form 567

JOINT ENGINEERING DEPARTMENT

WISCONSIN TAX AND RAILROAD COMMISSIONS

Detailed Summary

OF

Power Station Equipment

SHEET NO.------

Compiled by------Date-----

Checked by------Date-----

Date of Valuation----------

Company---------------------------------------

Station---------------------------------------

Equipment — Itemized	Cost New in Place	Scrap Value	Condition %	Present Value
Size of sheet $8\frac{1}{2}'' \times 11''$				

Form for Use in Summarizing the Valuation of a Steam Power Station

Items	Cost to Reproduce New	Present Value
1. Building		
2. Cranes		
3. Stacks		
4. Breechings from stacks to boilers		
5. Boilers, complete, including stokers		
6. Coal- and ash-handling machinery		
7. Forced draft apparatus and ducts		
8. Pumps, tanks, etc.		
9. Piping, complete		
10. Main engines and condensers		
11. Exciter engines		
12. Generators		
13. Exciters		
14. Switchboards and wiring to machines . . .		
15. Power house, tools and machinery		
16. Miscellaneous		
17. Total of items Nos. 1 to 16		
18. Add percentage to cover engineering, and supervision, interest during construction, employers' and public liability, contingencies, etc.		
19. Total of items Nos. 17 and 18		

Appraisal of a Water Power Privilege, either Undeveloped or Abandoned. — If a water power privilege is undeveloped, its value will depend upon:

(*A*) Its location, geographical, as regards facilities for construction, and for transmission, the quantity of water and regularity of flow, total head, need of water for purposes other than for power.

(*B*) The use to which the power can be put, whether for operating electrochemical plants requiring power for 24 hours per day — seven days per week; for textile mills or other factories requiring power for 10 hours steadily; for electric railways or electric lighting, each requiring power for most of the hours daily, but with

a variable load, or a steady load for some hours; or for pumping for irrigation.

(*C*) The condition of the market, which may be near by and ready to serve, or may be distant and the business may have to be worked up; the steadiness and reliability of such business.

The determination of the value of an undeveloped water power privilege should be made by comparison with the cost of producing and operating, a similar amount of power in similar territory for the same purpose for which it is proposed to use the new power. If the privilege will permit of the development of a large amount of power, then the estimates of cost and operation must be based upon the best and most economical and efficient types of apparatus; dams and buildings being of the most permanent nature, and the motor power apparatus of the most efficient type of the time. The steam or other plant with which it is to be compared should be of the latest type of steam turbine construction with the most efficient and economical boilers that can be installed. If, however, the water power privilege is of medium or small capacity, then it is best to make the comparison with plants of average efficiency and economy for the place when installed or for places equally convenient for the transaction of business.

Charles T. Main, M.E., of Boston, gives the following steps as proper to be followed in appraising an undeveloped water power privilege:[1]

"(1) Determine the flow, including the effect of storage and pondage.

"(2) Determine the net head.

"(3) Determine the horse-power which can be economically developed and used each month in an average year.

"(4) Determine the minimum flow and power, and from this the size of supplementary steam plant required if the power is to be developed above the minimum flow.

"(5) Determine the shortage of water power during such months as there is a deficiency.

"(6) Estimate the probable cost of development of the water power.

"(7) Estimate the probable cost of the supplementary plant, using steam, gas, oil, or anything which is best for the location under consideration.

"(8) Estimate the yearly cost of running the water power and supplementary plants, including the fixed charges on both, to produce a combined power suitable for the purpose for which the power is to be used.

[1] Paper before New England Water Works Asso., Sept. 12, 1907.

"(9) Estimate the cost of a steam or other kind of plant, necessary to produce the power required.

"(10) Estimate the yearly cost of running this plant, including fixed charges, to produce the power required.

"(11) Subtract the cost of producing the power by water power and the supplementary plant from the cost of producing it by steam power, or some other method, alone. The difference, if positive, gives the apparent yearly saving by the use of water power. The apparent saving should be modified if necessary for location or any other thing affecting the value.

"(12) Capitalize this difference at a rate which seems proper, and the result is the value of the privilege."

Of course there is much difference of opinion as to the rate at which this difference should be capitalized, as there are many rates involved, including that of the ever decreasing cost of producing power by steam and other methods. There are also possibilities of damages by freshets, rates of changes in business, etc., which would make it unsafe to capitalize at a rate less than 10 per cent.

Appraisal of Damages to a Developed Water Power. — The value of a water power which is developed naturally includes the present or depreciated value of the plant. This is true up to the point where the annual cost of water power, including fixed charges, equals or exceeds the annual cost of steam or other power with the fixed charges included. When the annual cost of water power exceeds that of steam or other powers, the value of the water power will be only the cost new of a plant, which would make the total cost of the water power, including fixed charges, equal to the cost of steam or other power, less depreciation.

The damage to a water power by diversion of part or all of the supply of water is defined as "the difference in value of the entire property before and after the diversion."

The damage to a water power where a diversion is made of a part or all of the water is represented by the increased cost of operation capitalized, and as such diversion is ordinarily made against the wishes of the owner, the damage should be an amount which will reimburse him for the total loss, or, say, the annual damage should be capitalized at 5 or 6 per cent.

The damage to a privilege which produces a variable amount of power, but which is not equipped with a supplementary plant, will be the same as if it were so equipped and should be so calculated.

When the water power conditions are such as to require a steam plant of sufficient capacity to produce the whole power for a part of the year, the damages will be the capitalization of the increased cost of operation due to the increased length of time the steam plant may be run.

Charles T. Main gives the following points to be determined in calculating the damages due to a diversion of part of the water from a developed privilege:

(1) Determine the flow, including the effect of storage and pondage, before and after the diversion.

(2) Determine the net head.

(3) Determine the horse power which can be economically developed and used before and after diversion.

(4) The difference between the power used before and after diversion is the power diverted which causes damage.

(5) Estimate the additional yearly cost of running caused by the taking away of this power, of coal, attendance, and supplies.

(6) If any permanent power has been taken, that is, power which can be relied upon in the lowest flow of the steam, estimate the cost of a steam plant or portion of plant necessary to make good the amount taken in the dry month.

(7) Estimate the fixed charges on this cost of additional supplementary plant.

(8) Add the extra cost of running and additional fixed charges, and the sum represents the extra yearly expense.

(9) This extra expense capitalized at a proper rate represents the damage.

Valuing an Hydroelectric Property. — A difference will be found in the value of hydraulic or water power properties between those located in the east and those in the west. In the east, they are more or less accessible, of low head and large quantities of water; in the west, largely in most inaccessible places, of high head and comparatively small quantities of water. In most cases, though, the list or form of summary accompanying this will be found to cover both districts quite fully.

In the extreme west it is found necessary to make very considerable explorations, long surveys and many measurements of water flow, and in order to get the minimum flow such measurements should be made late in the fall just previous to the annual rains.

While in the east the item *roads and trails* is hardly worth separation as an item of expense, yet in the far west the difficulties

and cost are very great, oftentimes roads of forty or fifty miles through mountainous country have to be constructed in order to reach the site of the dam, the locations along tunnels and flumes, and the power house site, not only with mere tools but with all supplies. In addition, the commissary department is very important and needs early and constant attention, especially is this the case as winter comes on in the mountains and a party is liable to be snowed in for several days.

Again, while in the east penstocks reaching from the fore bay to the wheels are of short length and large in diameter and may often be constructed directly in and of concrete, in the far west these take the shape of pipe lines, from 100 feet to 3000 feet in length, under a head of 100 feet to 2000 feet, and are necessarily constructed of heavy steel, well anchored and covered.

The item *headworks and reservoirs* includes all dams, mill ponds or reservoirs, headgates, and in fact the cost of everything up to the entrance of the canal or flume taking the water away from the reservoir.

Canals, tunnels, flumes, and fore bay include all that part of the works for conveying the water from the reservoir to the penstocks. In the east items of "canal" and "fore bay" would nearly always cover all the cost of this work, but in the far west it is not unusual to encounter miles of tunnels, miles of wooden or concrete flumes, miles of wood stave pipe, between the head works of a development and the fore bay at the head of the penstocks.

The item *water wheels and governors* should cover all hydraulic appliances between the end of the penstock and the armature of the electric generator, the shaft, common to both, being valued as a part of the water wheel.

Electric generators and plant include all electrical apparatus from, but not including, the armature shaft to and including the switchboards, transformers and to the first fastening of cables and wires outside the building. Electric wiring for lights in the building belongs to the cost of the building as does any wiring for power used in ventilating the building.

As in the majority of cases the electric energy developed by a water power is transmitted to some distance, the item *high tension transmission system* is meant to cover every part of the high tension construction built for the purpose of conveying the current from the power house to the center of distribution where

it is reduced in pressure. This necessarily includes all substations along the lines of the transmission, and all such substations as may receive the high tension current and transform it into current of a lower pressure. Where the transmitted current is taken direct to a central point, reduced to a lower pressure and then retransmitted to substations and again reduced to a still lower pressure for local distribution the classification of the high tension *transmission system* ends at the first or central point, all the rest coming under the head of *distribution system.*

Form of Summary for Appraisal of Hydroelectric Plant

Items	Cost to Reproduce New	Present Value
1. Roads and trails		
2. Headworks and reservoirs		
3. Canals, tunnels, flumes and fore bay . . .		
4. Penstocks and high pressure piping . . .		
5. Water wheels and governors		
6. Electric generators and plant		
7. Buildings and structures		
8. High tension transmission system		
9. Distribution system		
10. Miscellaneous		
11. Total of items 1 to 10		
12. Add percentage[1]		
13. Total of items 11 and 12		
14. Connections to customers		
15. Office furniture and fixtures		
16. Tools and implements		
17. Horses, wagons and harness		
18. Stores and supplies		
19. Paving		
20. Land and all rights of way		
21. Total of items 14 to 20		
Total of items 13 and 21		

[1] This percentage is to cover engineering, supervision, interest during construction, employers' and public liability, contingencies, etc.

Referring to the preceding form of summary for the appraisal of Hydroelectric property, the percentage for engineering and contingencies is added to the sum of the first ten items, the remaining items needing no addition, as they are ordinarily purchased in the regular course of current business. The item *connections to customers* is included in all valuations for the reason that the courts have so ordered. It is a question if they should be put into capital account, and if so, should be amortized at a heavy rate, this rate being determined by the estimated average permanency of the connections. Underground services are constructed from main to curb at the expense of the company, and of course remain the property of the company. It is only the balance of the connection, that upon the property of the customer, that may be in question.

Detail forms for use in the appraisal of a water power property are rather difficult to devise beforehand, as almost every case is unique; but for dams, tunnels, canals, flumes, etc., the following list of items may be of assistance:

Dam:
Total length.
Total height.
Length of spillway.
Height of spillway.
Cubic yards of excavation.
Cubic yards of material of construction.

Headworks:
Dimensions.
Cubic yards of excavation.
Cubic yards of material of construction.
Number of headgates.
Dimensions of headgates.
Dimensions of racks.
Machinery for operating headgates.

Tunnels:
Dimensions.
Cubic yards of material through which cut.
Cubic yards of lining, if concrete.
Quantity of other materials for lining.

Flumes:
Dimensions.
Cubic yards excavation.
Cubic yards masonry.
Cubic yards concrete.
Wood, dimensions of and quantity.
B. M. quantities of timber in flume.
B. M. quantities of timber in trestles.

Siphons:
Cubic yards excavation.
Earth.
Rock.
Steel pipe, dimensions, length, diameter, thickness.
Weight of pipe.

Canals:
Dimensions.
Length, width, depth.
Cubic yards of excavation.
Masonry, cubic yards.
Gates and operating mechanism.

Fore bay:
Dimensions.
Cubic yards masonry.
Gates and operating mechanism.
Gratings, dimensions.

Penstock or pressure pipe:
Dimensions.
Weight of material.
Cubic yards excavation, and backfill.

Buildings are treated under a separate heading, as is also the machinery, — except the waterwheels, — switchboard and other electrical apparatus. Turbine waterwheels are inventoried on the following form, which is one of those devised by the Joint Engineering Department of the Wisconsin Commissions.

Company ____________________ W. B. A. Form 562 Sheet No. __________

Power Plant Equipment

WATER TURBINES

Name of Plant ________________ ____________________ Inspector

City ______________ Date ______________

Name of Maker ....
Location of Factory ....
Station No. ....
Location in Station ....
Maker's Designation & No. ....
Size of Turbine ....
Impulse or Reaction ....
Vertical or Horizontal Shaft ....
Central or Outward Discharge to Draft Tube ....
Number of Units ....
No. of wheels per unit ....
Gates :- cylinder, register, flutter, or wicket ....
Draft Tube Diam. .... Length ....
Thickness .... Material ....
How Riveted ....
Draft Chest — Dimensions and Material by sketch.
Penstock or Casing Diam. .... Length ....
Thickness .... Material ....
How Riveted ....
Total Wgt. of Turbine .... Includes ....
....
Classification of service ....
Head Max .... Min .... Average ....
Speed ....

Size of sheet $8\frac{1}{2}'' \times 11''$

Horse Power .... Authority ....
Direct Conn. geared or belted to ....
....
Type Governor ....
No. of Governors ....
Repairs or Alterations and When ....
....
....
Method of Lubricating ....
....
Operation how many hrs. per day ....
Average Load ....
In Operating Condition? ....
Condition G., F. or P. ....
Date Installed .... Age ....
Previous History ....
....
Cost .... Includes ....
....
Authority ....
Remarks ....
....
....
Sketch details of setting on back of sheet.

Valuation of a Waterworks Property. — Land and buildings are treated in previous chapters, leaving the operating plant and distributing system to be covered here.

Wells, if driven, are valued at so much per foot; while excavated wells can be appraised on the cubic yard basis. Reservoirs will ordinarily be covered by the land values, but the dam built to create the reservoir will have to be appraised as in water power property, by the cubic yard.

Form of Summary for Appraisal of Waterworks

Items	Cost to Reproduce New	Present Value
1. Wells, intake and suction		
2. Reservoirs and standpipes		
3. Distribution system		
4. Buildings and structures		
5. Pumping plant and equipment		
6. Miscellaneous		
7. Total of items 1 to 6		
8. Add percentage[1]		
9. Total of items 7 and 8		
10. Connections to consumers		
11. Office furniture and fixtures		
12. Tools and implements		
13. Horses, wagons and harness		
14. Stores and supplies		
15. Paving		
16. Land		
17. Total of items 10 to 16		
Total of items 9 and 17		

Above is a form of summary to be used in completing an appraisal of waterworks. It will be seen that a percentage is charged only on the total of items 1 to 6, while items 10 to 16 take no percentage, as items 10 to 14 included are being purchased or installed during current business. The same remarks apply to paving here that were made on street railways, as also do the

[1] This percentage is to cover engineering supervision, interest during construction, employers' and public liabilities, contingencies, etc.

remarks on land. Item 10, "Connections to Customers," must be kept entirely separate, as the item is only retained in a valuation because it has been decided by court that even though the Company did not own them, yet they must be treated as if *Company owned* in an appraisal.

> "The 'fair and equitable value' of the works, to be paid therefor by the city under such act, should not be determined by capitalization of the earnings, — thereby, in effect, valuing the franchise, which no longer existed, — nor should such value be limited to the cost of reproducing the plant, but allowance should be made for the additional value created by the fact of connections with and supply of buildings, *although the company did not own the connections.*" (62 Fed. Repts., 853.) July 2, 1894, National Waterworks Co. *v.* Kansas City.

The two forms following are among those devised by the Joint Engineering Department of the Wisconsin Commissions. The first refers to the detail of waterworks pumps. Boilers, and other steam auxiliaries, are the same as those of any steam-power plant, and forms for use in appraising them will be found on pages 96 and 97.

If the pump is operated by water power, form for inventorying the turbine wheels will be the same as that used for a water power and is shown on page 114.

The second blank given here is for use in appraising the mains buried in the street, and the same form can be used for appraising the mains of a gas property. When records are found to be incomplete it is well to dig up the streets at intersections to determine the location, size, material and condition of pipes.

The price of cast iron pipe varies so much that it probably is the fairest to take as an appraisal price the average for a term of years, say five years, although the courts apparently decide that the price at the date of appraisal is the one that must be used.

Company ______________________

W. B. A. Form 563

Sheet No. ______________________

Name of Plant ________________

WATER WORKS PUMPS

______________________ Inspector

City ________________________

Date ______________________

Station Designation No. ....

Name of Maker ....

Address ....

Maker's Designation and name plate data ....

Power, Centrifugal or Steam Pump ....

If Power Pump, give data of Driver ....

If Centrifugal, give No. of Stages ....

Steam End: Simple, Compound, or Triple; Tandem or Cross; Corliss, Slide Valve, or other Type; Flywheel or Direct Acting; Vertical or Horizontal; Condensing or Non-Condensing.

Water End: Simplex, Duplex, or Triplex; Packed Piston, Plunger and Ring, or Outside (Center or end) Packed; Valve Pot or Box Type; Removable or Driven Liner (Iron or Brass).

Classification of Service ....

Size Pump ....

Capacity, Gal. in 24 hrs. ....

Pressure, Domestic .... Fire ...... Steam ......

Duty .... Ft. lbs. per 1000 Steam

Size Steam Pipe .... Exhaust ...... Suction ......

Discharge ....

Size of sheet $8\frac{1}{2}'' \times 14''$

Piston Speed or R. P. M. ....

No. of Valves Suct. .... Size ....

Disch. .... Size ....

Live Steam Connection to L. P. Cyl. ....

Sketch and Dimension on back of sheet.

Brass or Iron Piston Rod Stuffing Boxes ....

Steam Piston Rod (Steel, Brass, or Brass Cov.)

Iron or Brass Water Plungers or Pistons ....

Water Rod (Steel, Brass, or Brass Cov.) ....

Discharge Chamber ....

Suction Chamber ....

Operated (Hrs. per day) ....

In Operating Condition? ....

Maintained, G., F. or P. ....

Date Installed .... Age ....

Previous History ....

Net Weight .... Includes ....

Cost .... Where ....

Includes ....

Source of Information ....

Remarks ....

....

Wisconsin Appraisal as of Date______ Form U-20 Sheet No.____________________

Name of Company________________ **DETAILED REPORT OF____________MAINS** Compiled by____________________

Location__________________Wis. Date____________________

Nominal Diam. of Pipe	Kind of		Location of Section			Length (Feet)	Weight of Pipe per Ft.	Date Laid	Depth of Trench	Give Here Kind of Soil and Other Conditions Affecting Cost of Work	Street Surface
	Pipe	Joints	On	From	To						
					Size of	sheet	$8\frac{1}{2}'' \times$	$11''$			

PUT NOTHING IN THIS SPACE

Valuation of a Telephone Property. — The preparation of schedules of the property of a telephone company will call for considerable detail work, with good judgment, much experience and expert knowledge of the business. Especially is this the fact when one comes to applying depreciation, for the judgment of authorities in different parts of the country varies considerably as regards the rates to be used. For instance, Chicago charged $12\frac{1}{2}$ per cent for annual depreciation on underground cable while Boston only charged $7\frac{1}{2}$ per cent, and the Michigan appraisal used 10 per cent. Underground conduit in Boston was depreciated at the rate of $3\frac{1}{2}$ per cent, while in Chicago it was calculated at a 5-per cent rate.

A greater rate of depreciation is allowable on telephone lines than on those used by the telegraph for the reason that they have to be maintained at a better standard of construction in order to produce satisfactory results. Telegraph lines will stand a rate of depreciation of 5 per cent, while a rate of 8 per cent is more equitable for telephone lines.

The following is an abstract of the rules followed in regard to the telephone valuation in the Michigan appraisal:

"*Cost of Reproduction.* With the exception of copper, current prices have been used for labor and material, it being considered that the current prices are not subject to fluctuations and will not be materially lower in the future. For copper wire, however, which has been subject to and will continue to fluctuate, an average price for the past seven years has been used. Where different prices are noted for similar classes of equipment the same may be interpreted to signify a difference in character and quality of construction.

"*Rate of Depreciation.* An arbitrary figure of 40 per cent of cost of reproduction has been taken, below which no depreciation has been allowed, if the equipment is still in use or likely to be continued in use. If not in use or not likely to be used again, its junk value only has been taken. This applies to all the following equipment:

"*Poles and Cross Arms.* Accepting about twelve years as the average life of a pole line, a depreciation has been allowed of 8 per cent per annum.

"*Wire.* As explained above, the cost of reproduction of copper wire has been taken from the average price for the past seven years. Inasmuch as the cost of copper wire is figured from its weight, its value does not differ materially regardless of its length of service. As 80 per cent has been taken as the junk value of all copper wire in use, no depreciation has been allowed below that figure. For copper wire in use 1 year or less its full value will be taken.

"For 2 years and less than 3 years, $2\frac{1}{2}$ per cent.
"For 3 years and less than 5 years, 5 per cent.
"For 5 years and less than 10 years, 10 per cent.
"For 10 years and over, 20 per cent.

"*Underground Conduit.* A depreciation has been allowed at 2 per cent.

"*Cable.* For both aërial and underground (lead-covered and rubber) cable a depreciation has been allowed of 10 per cent per annum.

"*Submarine Cable.* In all cases this material has been treated specially, the same general conditions not being met with in different pieces of submarine cable.

"*Subscribers' Stations Equipment.* — Accepting ten years as the average length of time that this equipment is used, or can be used, a depreciation has been allowed of 10 per cent per annum.

"*Switchboards.* Under general conditions, a central office installation does not exceed an average length of life of ten years. A depreciation has, therefore, been allowed of 10 per cent per annum."

Form of Summary for Use in the Appraisal of Telephone Properties

Items	Cost to Reproduce New	Present Value
1. Buildings and structures		
2. Exchange equipment		
3. Telephones and appliances		
4. Distribution system		
5. Power plant equipment		
6. Shops, power and equipment		
7. Miscellaneous		
8. Total of items 1 to 7		
9. Add percentage [1]		
10. Total of items		
11. Connections to customers		
12. Office furniture and fixtures		
13. Tools and implements		
14. Horses, wagons and harness		
15. Stores and supplies		
16. Paving		
17. Land		
18. Total of items 11 to 17		
Grand total of items 10 and 18		

[1] This percentage is to cover engineering and supervision, interest during construction, employers' and public liability, contingencies, etc.

Above is a form of summary for use with the appraisal of a telephone property. The same remarks apply to the items above and below the percentage item as in the summaries for railways and waterworks. A notable valuation of telephone properties was that of the New England Telephone Company by Professor D. C. Jackson. Too much care cannot be taken in making up the original list or inventory of such a property. Unlike waterworks, gas and electric light connections, those made by a telephone company belong to the company, but produce little if any scrap or salvage, except for the instruments, when removed.

With slight modification, forms used for telephone appraisals can be used for valuing telegraph properties.

Court Decisions on Telephones. — In the case of the State of Oklahoma and others against the Pioneer Telephone and Telegraph Company, operating a local telephone exchange at Enid, and toll and long-distance lines to other parts of the state, the Supreme Court has handed down an important decision involving the reasonableness of rates charged by a telephone company apparently establishing the law governing regulation of rates by public-service corporations in that state.

The case reached the Supreme Court from the Corporation Commission of that state, and the opinion and decision of the Court involved a discussion of the question of the valuation of the property, the right and obligation to create a depreciation reserve fund and the rate of return, these three questions being the subject of contention between the Company and the Commission:

> "There is no contention that any value on account of unexpired, franchise or for good will should be added to the productive value in order to ascertain the present value, but it is contended that by reason of the fact that appellant's plant has an established system of operation, has at present customers sufficient in number to pay the operating expenses and annual depreciation and some profit, it has a value beyond the mere cost of reproducing the plant. This element of value contended for has been generally referred to by the authorities as the 'going concern value,' or 'going value.'
>
> "It is apparent, however, that a complete telephone plant, without a single subscriber, or with but few subscribers, is less valuable to both the owner of the plant and to the members of the public it serves, than the same plant with large patronage. The more people a subscriber can communicate with over a telephone exchange the more service, as a general rule, is such an exchange to him; and it is only

when such exchange has subscribers that the property of the owner invested therein has an earning power. But subscribers are not obtained without expenditure of money, labor and time, during which the capital invested in the plant earns nothing and often fails to pay operating expenses.

"During the term of development there is a loss of money actually expended and of dividends upon the property invested. How shall this be taken care of? Must it be borne by the owner of the plant? Or by the initial customers? Or shall it be treated as part of the investment or value of the plant, constituting the basis upon which charges shall be made to all customers who receive the benefits from the increased service-rendering power of the plant by reason of these expenditures? It seems that the last solution is the original, just and correct one. If rates were to be charged from the beginning so as to cover these expenditures and earn a dividend from the time a plant is first operated, the rate to the first customers would be in many instances, if not in all, so exorbitant as to be prohibitive, and would be so at the time when the plant could be of least service to them. On the other hand, the public cannot expect as a business proposition or demand as a legal right that this loss shall be borne by him who furnishes the service, for investors in public service property make such investments for the return they will yield; and, if the law requires that a portion of the investment shall never yield any return, but shall be a total loss to the investor, capital would unwillingly be placed into such classes of investments; but the law, in our opinion, does not so require. Private property can no more be taken in this method for public use without compensation, than by any other method. When the use of the property and the expenditures made during the non-expense paying and non-dividend paying period of the plant are treated as an element of the value of the property upon which fair returns shall be allowed, then the burden is distributed among those who receive the benefits of the expenditures and the use of the property in its enhanced value."

Valuing an Electric Light and Power Plant. — The appraisal of an electric light property is comparatively easy, as it is nearly all permanently placed and is not moving about as are street cars. Little advice is necessary, other than to be careful in making inventories that everything is included. The ordinary electric plant about the country should be appraised complete easily in thirty days, some of them in less time.

The National Electric Light Association has spent much time and has been to a great deal of trouble in getting up a standard system of accounts which has been agreed upon, and it is hoped

that the companies will make up all their books upon the common basis specified. Following is a schedule of these accounts as taken from the standard book of rules issued by the association:

Schedule of Accounts as Specified by the National Electric Light Association

CONSTRUCTION ACCOUNTS

Organization.

Royalties, franchises and licenses.

Generating plant — steam.
- Land.
- Structure.
- Boiler plant.
- Prime movers.
- Electrical plant.
- Miscellaneous.

Generating plant — hydraulic.
- Land.
- Structure.
- Dams, canal and pipe lines.
- Turbines and water wheels.
- Electrical plant.
- Miscellaneous.

Generating plant — gas.
- Land.
- Structure.
- Gas producers and accessories.
- Gas engines.
- Electrical plant.
- Miscellaneous.

Underground conduits.

Poles and fixtures.

Transmission.
- Conductors — overhead and underground.
- Land.
- Structure.
- Substation equipment.

Storage batteries.

Distribution.
- Overhead conductors and devices.
- Underground conductors.
- Services.
- Meters.
- Line transformers.

Arc and glower lamps.

Customers' installation.

Municipal street-lighting system.

General office and branches.
- Land.
- Structure.
- Furniture and fixtures.

Other equipment.
- Land.
- Structure.
- Coal-storage equipment.
- Shop equipment.
- Storeroom equipment.
- Stable equipment.
- Laboratory equipment.
- Tools and implements.

Miscellaneous — during construction.
- Engineering and superintendence.
- Law expenditures.
- Taxes.
- Interest.
- Injuries.
- General.

In making an appraisal of an electric light property it is not necessary to summarize in such detail as is shown in the above list of accounts, but a summary such as follows can be made sufficient for the purpose and the detail of which it is made up can be used for filling out the more elaborate summary if found necessary.

As will be seen by reference to the following form, the percentage is added to the first five items only, the remaining items requiring no addition for engineering and contingencies. The item "connections to customers" is included in the valuation because so

ordered by the courts. It is still a question, though, if they should be charged in capital account, and if so, should be amortized at a heavy rate, this rate being determined by the estimated average permanency of the connections. Underground services are extended from main to curb at the expense of the company, and of course remain the property of the company. It is only the balance of the connection, that upon the property of the consumer, that is in question.

Form of Summary for Appraisal of Electric Light and Power Company

Items	Cost to Reproduce New	Present Value
1. Buildings and structures		
2. Power plant equipment, including storage batteries		
3. Distribution system		
4. High tension transmission system		
5. Miscellaneous		
6. Total of items 1 to 5		
7. Add percentage[1]		
8. Total of items 6 and 7		
9. Connection to consumers		
10. Office furniture and fixtures		
11. Tools and implements		
12. Horses, wagons and harness		
13. Stores and supplies		
14. Paving		
15. Land		
16. Total of items 9 to 15		
Total of items 8 and 16		

Items 10 to 13 are being maintained by constant purchase, and it is most obvious that no percentage should be charged against them.

Item 14, *Paving*, is only included where a local company has

[1] This percentage is to cover engineering, supervision, interest during construction, employers' and public liability, contingencies, etc.

conduits in paved streets, and even then it is nearly always in dispute as to whether pavement should be included in the capital or should be charged to an expense account.

The last item, No. 15, *Land*, is almost always purchased through a real estate dealer, who invariably charges his commission to the seller. When purchased straight, as between the company and owner, there will be no expense. Preliminary surveys, estimates, etc., should be charged to development expense.

In appraising the copper wire it is fairest to take the average price for a term of years — say, five — rather than the price on the day of the appraisal, even though the Supreme Court decided that the prices at the date of the valuation were the ones to use.

Prices of poles might be the average for the same length of time if of enough importance, or if the change in price had been considerable during the time of upbuilding.

Valuing a Gas Plant and Property. — The principal difficulty about appraising a gas property is in determining and verifying the size and quality of the mains that are buried in the streets. Often records are incomplete, especially so with companies which have been established for a long time. To be sure, even with what are apparently complete records, it is best to make an excavation at street intersections, uncovering the pipe so that it may be inspected for type, size, quality and deterioration. The form shown on page 118, under waterworks appraisal, can be used for pipe inventory.

It may be necessary also to excavate in the street for one or more house connections in order to show how made, type of connections and pipe used, size and amount of deterioration. In listing house connections it is best to separate them into two parts, *i.e.* length from main to curb, which belongs unquestionably to the company, and from curb to house, the ownership of which is always in question. The average length from main to curb can be gotten from the map, but the lengths from curb to house will have to be approximated and can be taken as an average length, although perhaps more accurate to average the length of the connection on each street.

In appraising the cast-iron pipe in the distribution system of a gas plant it is best to use the average price for a term of years, or at least for a period that would be taken to install the plant complete.

Listing, checking and appraising other items in a gas plant present few difficulties other than care in setting prices for the particular locality; these will sometimes be governed by excessive freight charges when at considerable distance from supply. Prices for labor also must be given close attention.

Following will be found a form of summary for use with the appraisal of a gas property, and the remarks made for the electric light schedule regarding items below the percentage added and connections to customers apply with equal force to this list.

Form of Summary for Use in the Appraisal of a Gas Property

Items	Cost to Reproduce New	Present Value
1. Buildings and structures		
2. Gas generating plant and equipment		
3. Distribution system		
4. High pressure system		
5. Miscellaneous		
6. Total of items Nos. 1 to 5		
7. Add percentage [1]		
8. Total of items Nos. 6 and 7		
9. Connections to consumers		
10. Office furniture and fixtures		
11. Tools and implements		
12. Horses, wagons and harness		
13. Stores and supplies, including manufactured gas in holders and mains		
14. Paving		
15. Land		
16. Total of items Nos. 9 to 15		
Total of items Nos. 8 and 16		

Land and buildings are treated in previous chapters.

[1] This percentage is to cover engineering, supervision, interest during construction, employers' and public liabilities, contingencies, etc.

The *Gas Generating Plant* will consist of:

Benches of retorts.
Water gas machines, complete.
Oil gas generating machines.
Scrubbers and condensers.
P. and A. tar extractors.
Cast-iron washers.
Exhausters.
Purifiers.
Cast-iron gas connections within the plants.
Piping for blast lines.
Piping for oil lines.
Piping for drains.
Piping for steam.
Piping for water.
Boilers, steam.
Pumps, for boiler feed and for other purposes.
Centrifrugal blowers.
Station meters.
Ammonia concentrators.
Ammonia storage tanks.
Tar and ammonia wells.
Holders, or gasometers.
Governors.

The *Distribution System* will be made up of:

Mains on street, starting at the gasometer.
House services, from main to curb.
House services from curb to meter in the house.
Meters on premises of customers.
Pressure regulators on customers' premises.

The *High Tension System* will consist of:

All appliances in the plant for raising the pressure, such as pumps;
All high pressure tanks or appliances outside the plant used exclusively for operating the high pressure system;
All high pressure mains; and,
Any gasometer that may be used for regulating the pressure for service, including any regulators.

Valuing a Manufacturing Property. — The appraisal of a manufacturing property differs from that of an electric light power station only in there being more detail, one of the most troublesome items being that of materials in process of manufacture. These should be priced at the cost up to the point where found. Conservative manufacturers appraise manufactured product in stock, ready for sale at the cost to them; others estimate it at the market price at date of the inventory. The following extract from Treasury Decisions shows how the Government looks upon this item on account of the Special Excise Tax.

> "44. Cost of manufactured articles, or articles in process of manufacture, held to include original cost of materials used plus cost of labor, etc." (Internal Revenue T. D. 1742, Dec. 15, 1911.)

It is hardly possible to make a summary that will apply to all manufacturing plants, but the following will suffice for most of them.

Sketch of a Summary for Use in Valuing a Manufacturing Property

Items	Cost to Reproduce New	Present Value
1. Power plant, including dams and reservoirs, canals and penstocks, waterwheels and governors, boilers and engines and all steam plant		
2. Shafting and belting		
3. Machinery for manufacturing: here list the main manufacturing equipment of the factory, such as looms and spinning frames, knitting machinery, etc., if textile; machine tools, if making metal goods, etc.		
4. Repair shop equipment and tools		
5. Buildings and structures		
6. Manufactured product		
7. Miscellaneous, including material in process of manufacture		
8. Total of items 1 to 7		
9. Add percentage[1]		
10. Total of items 8 and 9		
11. Office furniture and fixtures		
12. Horses, wagons and harness		
13. Stores and supplies		
14. Land, including fence		
15. Railroad siding		
16. Total of items 11 to 15		
Total of items 10 and 16		

[1] This percentage is to cover engineering, supervision, interest during construction, employers' and public liabilities, contingencies, etc.

CHAPTER VI

THE COST OF VALUING A PROPERTY

One of the first questions to be asked when the appraisal of a property is under consideration is, what kind of a valuation is wanted, that is, to what extent is detail required, whether a valuation is wanted on the unit cost basis, or on the basis of a bill of material; whether a complete list of items in great detail will be necessary, or if an inventory can be taken of the main producer units and unit price assigned to them? All these and many other particulars must be known if one is to give a proper estimate of the cost of an engineering valuation of a large property. The cost of a unit valuation may be very small and can be completed in a short time and by a very small force. The writer has alone made in thirty days such a valuation of a property which amounted to five million dollars, and again in twenty-five days of another property valued at three million dollars. A recent valuation of a railroad system in the north was made in ten days by an engineer who had to take his appraisal into court. A safe estimate for the cost of valuing large properties is from three tenths to five tenths per cent of the total value found. Appraisals of property when the inventory is made in full detail will take from two months to a year and can be made to cost any sum the owners may set, by arranging the amount and completeness of the inventory according to the price desired. Some appraisals where full and accurate detail have been wanted have taken a chief engineer and force of fifty men two to three months; others have made use of sixty men for six months. All depends on the experience of the workers and the completeness of the inventory desired. When inventories are prepared by the owners so that they may be checked up quickly by the appraiser, an expert appraiser can check up the material quite as much as may be necessary and place prices which can be extended by the clerical force of the owners, if economy is desired, and the whole matter can be closed in ten days

with but one expert appraiser necessary. This applies of course to a small plant of whatever nature.

A factory property can be inventoried by a shop force, checked by the appraisers, prices set by experts, summarized and a complete report made in almost any length of time that may be desired.

Some of the best listers, makers of inventory and expert appraisers of factory property and small wares are the people employed for such work by the large auctioneering firms. They are the most systematic and highly experienced of any men of like business the writer has come across.

CHAPTER VII

VALUE OF GOOD WILL, GOING CONCERN OR GOING VALUE

Lord Elden says that "good will is nothing more than the probability that the old customers will resort to the old place . . . that it involves an element of personal choice, and is inappropriate where there can be no choice, and therefore should be given no value."

Justice Moody, in his opinion on the Knoxville Water Company case says, of *going concern value:*

> "This sum we understand to be an expression of the added value of the plant as a whole over the sum of the values of its component parts, which is attached to it because it is in active and successful operation and earning a return. We . . . leave that question to be considered when it necessarily arises."

John W. Alvord says, "Going value may . . . be defined as the value of a created income, or, . . . is the cost of reproducing a given income."

And again, the late Wm. H. Bryan gave as a definition of "going value":

> "It is the value such a plant has over and above its physical value, due to the fact that it is not a bare and idle system, but it is in actual operation, doing business with large numbers of connected customers. It is something like the good will of a business, but is even more tangible."

It is thought that the above definitions sufficiently elucidate the terms "good will," "going concern" and "going value," but the difficulty remains as to how to evaluate the property so defined. It has been said that value is that sum which an article will bring when sold by a willing seller to a willing buyer, and on this basis it also might be remarked that the value of the above-mentioned features, either one or all, would be represented by the amount over and above the actual physical value of a property that a buyer would willingly give. As a matter of fact, English syndicates when purchasing property in the United States often-

times express the value of the good will in terms of the net income produced by the property in an agreed number of years. That is, after evaluating the physical plant and agreeing upon that point the value of the good will, etc., will be the sum of the net income earned by the property for, say, three consecutive years immediately preceding the sale. Cases are known where as high as five years' net income has been paid for the good will of a very profitable manufacturing concern. For manufacturing properties this method offers an easy solution of the problem.

An allowance for "good will" is not applicable to a public utilities property when such a property is a monopoly, for all court decisions are against it. The terms "going concern" and "going value" are practically synonymous, and may be further defined as representing that increase in value due to the human effort put into the property by the management, including not only the actual money expended in building up the business but the quality of brains brought to bear on the work. In appraising waterworks property, "going value" is represented by the connected business worked up by the management, but in addition, the popularity of the management and the company, which if in good standing with the public will add still further to the "going concern" value. This last value is one of the most difficult to appraise and under any circumstances will be an arbitrary value based upon the opinion of some one experienced in appraising such matters. As to the value of a worked-up business, the Wisconsin Commission holds, in one case, "that the actual reasonably wise expenditure of money towards getting the business of the plant established may be included in the value to be allowed for the purpose of fixing rates."

Again, in the opinion of Judge Savage in the case of Brunswick and Topham Water District *v.* Maine Water Co., the judge says:

> "that the value of a structure is enhanced by the fact that it is a structure in actual use, . . . it is a going concern, the going concern part of it has no existence except as a characteristic of the structure. If no structure, no going concern. If a structure in use, it is a structure whose value is affected by the fact that it is in use. There is only one value. It is the value of the structure as being used."

But this "going value" was first officially recognized in a decision rendered by Justice Brewer in 1894 in the Kansas City Waterworks case (62 U. S. Fed. Rep. 853). "The City steps into possession

of a property which not only has the ability to earn, but is, in fact, earning. It should pay, therefore, not merely the value of a system which might be made to earn, but that of a system which does earn."

The difficulty of appraising going concern value may be illustrated still further by the fact that in one of the most important appraisals of recent years, in the hands of five of the leading specialists of the country, no two of them agreed as to the method of computation. Therefore one hesitates to attempt to outline any method of evaluating any one of these items until such time as a very full discussion may be had by a board competent to judge of methods and results. Such a discussion was had of the paper by John W. Alvord, "Notes on Going Value," read in June, 1909, before the American Waterworks Association, and yet little result in the way of decisive methods came from it. Even the definitions of the terms here under discussion are not agreed upon, so that one engineer gives one meaning to a term, and possibly mixes his definition with that of another. Perhaps no better action could be taken than to have a joint committee appointed by each of the national societies, which committee should meet and agree on the proper definitions for these terms and then bring them before the main bodies for discussion and adoption. If any agreement could be made tending toward some standard method of estimating the values of *good will*, *going concern* and *going value*, which would pass muster with the courts, great value would accrue.

Earning value is another term which is closely allied with the three above mentioned and seems to be especially recommended by all writers on railroad values. It has evidently been given serious consideration by the Wisconsin Commission, for in the case of Hill *v.* Antigo Water Co., 3 W. R. C. 623, and later in State Journal Printing Co. *et al. v.* Madison Gas and Electric Co., 4 W. R. C. 582, the commission has made tables computing the *earning* or, as they discuss it, the *going value* of the properties there considered.

In discussing the evidence produced by the expert witnesses for the respondent company in the Madison Gas case the commission covers all items heretofore classed as *good will, going value, earning value,* etc., as follows:

> "The connected load or business is, of course, of value but it appears to us that this value is covered by the cost of establishing the connections and acquiring the business, which costs, in one form or another, have

found their way into the accounts of the company and therefore constitute a part of the facts that are taken into consideration in appraising the plants. The keeping of the plant in good repair or good operating efficiency is an item that is covered in the operating expenses and, theoretically at least, is borne by the consumers. It is not an item for the capital account. Possible future growth of the business can hardly be legitimately capitalized by utilities which are not entitled to more than reasonable returns on their investment; and this is also true of the rights to do business in a particular city, which rights have been granted free of cost. The ownership of land to meet future demands would not seem to imply any other value than that which is given to this land by including it in the physical valuation. Monopoly privileges can manifestly not be justly capitalized as against consumers: nor is the amount a man might be willing to pay for a plant a safe guide to its value, at least not unless all the facts which led to its purchase are fully understood. The offer, for instance, might be based upon conditions that are either temporary or without much significance in so far as they relate to the value of the plant. One year's, or even the first year's gross receipts, may throw some light on the amount of business a plant has, but it is not clear to us on just what theory they represent the going value of the plant.

"In a certain sense the elements enumerated, together with other like elements, can be said to have value. But it seems that these values depend upon and are covered by the amounts that have been economically and legitimately invested in the physical property of the plant, the natural increase in the value of the land, such increases in the value of other physical parts that may be due to increase in prices, and the cost of developing its business as measured by the deficits from operation when all proper and legitimate outlays are included in the operating expenses. The investment in the plant and its business, as thus measured or determined, seems to us to constitute the valuation upon which the investors may ordinarily be entitled to reasonable returns and upon which, under like conditions, it may be the duty of the consumers to pay rates that will yield such returns to the investors.

"It is true that such elements of value among those which have just been enumerated, as the natural increase in the value of land and such increases in other property as may be caused by rising prices of labor and material, may not be offset by actual outlays on the part of the owners of such plants; that to include such items in the valuation may, in a sense, amount to a capitalization of unearned increments, and that there may be some question as to whether this is equitable, as between company and consumers. There is much, however, to be said on the other side of this question. That the law as well as our social system recognizes such gains in practically all other under-

takings, is evident from the fact that rents and interest charges usually vary with the natural increase in the value of the property they cover. As the cost of reproduction of a plant usually plays perhaps the most important part in determining its value, it is more than likely that the owners would have to bear losses in case land and other property had depreciated instead of appreciated. It would seem only just that the rule should work both ways. Appreciations in value of the kind in question are also of an essentially different nature from such appreciations in value as those which by the respondent's testimony is classed as going value. It is appreciation of a kind that is generally acknowledged as rightfully belonging to the owners of the property which has thus risen in value. It is based neither on unreasonable rates, nor on assumed business conditions or similar facts of this nature. It is simply due to general growth and development. In view of these facts there would seem to be good ground, from both a legal and economic view point, for giving such appreciations in value consideration in appraising public utilities. At any rate, we cannot now see good reasons upon which to exclude these elements from the appraisal of utility properties."

The Commissioners tabulated figures showing all the elements mentioned. A copy of the table showing the "*earning value*" of the electric light plant at Madison is shown below, leaving out the gas plant for the sake of clearness.

MADISON GAS AND ELECTRIC CO. — EARNING VALUE — ELECTRIC PLANT

Year	Earning Value Jan. 1	Additions to Depreciable Property	Increase Land Values	Depreciation Straight Line Basis	Interest 8% on Value	Total	Net Earnings from Operation	Value Dec. 31
1896 [1]	$134,400	$6,745	$921	$4,030	$7,168	$153,264	$14,718	$138,546
1897	138,546	13,141	1,620	6,390	11,084	170,781	25,427	145,354
1898	145,354	8,613	1,620	7,066	11,628	174,281	30,123	144,158
1899	144,158	17,693	1,620	7,509	11,533	182,513	34,120	148,393
1900	148,393	34,550	1,620	8,419	11,871	204,853	32,924	171,929
1901	171,929	45,960	1,620	10,196	13,754	243,459	34,810	208,649
1902	208,649	55,329	1,620	12,559	16,692	294,849	40,388	254,461
1903	254,461	34,936	1,620	15,403	20,357	326,777	31,818	294,959
1904	294,959	23,345	1,620	17,199	23,597	360,720	38,751	321,969
1905	321,969	42,889	1,620	18,400	25,758	410,636	40,938	369,698
1906	369,698	13,138	1,620	20,605	29,576	434,637	54,341	380,296
1907	380,296	81,707	1,620	21,281	30,424	515,328	61,560	453,768
1908	453,768	13,887	.....	25,482	36,301	529,438	78,987	450,451

[1] Nine months.

First, the cost of the electric plant at the time it was acquired by the Company was determined as closely as possible. To this

cost was added all the new extensions; increases in land values; depreciation; and interest and profit calculated on the original cost at the rate of eight per cent. All of these items were added together, and from this total was deducted the amount of the net earnings for the year, the balance showing the value of the plant at the end of the year, which amount was carried forward and became the starting amount or "Earning Value" for Jan. 1st for the following year, and to this amount was again added the amount representing the same items as mentioned above, thus determining for each year the value which could be used for the following year as the starting or earning value of the plant at that time. The last value determined, that for the year ending Dec. 31, 1908, was taken as the earning value of the plant. The only point that needs explanation in this computation is, the *addition* of the depreciation to the values, instead of subtracting it from the income. Of course the result is the same in either case, but the Commission here calculated on the setting up of a depreciation account to which a certain sum should be added out of the surplus each year. Again, the computing of interest and profit at the rate of 8 per cent, and the addition of this amount and the depreciation to the general cost had the effect of carrying forward to the next year any balance of the depreciation, interest and profit that was not covered by the net earnings for the year, to be paid during the prosperous years later on in the life of the plant. The results showed that the total net earnings had been more than sufficient to cover the cost of operation, depreciation, interest and profit at the rate of 8 per cent on investments.

This method of computing the *going value* of a corporation is merely basing such a value on the earnings alone and must be used with much care, for the courts look askance on a value *of property* based upon earnings, although some of the decisions in the past have taken earnings into consideration in calculating the value. (See Cotting *v.* Kansas City Stockyards Co., 52 Fed. Rep. 851; Monongahela Navigation Co. *v.* U. S., 13 Sup. Ct. 622; Montgomery County *v.* Schuylkill Bridge Co., 20 Atl. Rep. 407; and Covington and Lexington Turnpike Road Co. *v.* Sanford, 17 Sup. Ct. 198.)

"When a valuation is placed on property, which has become affected with a public use, for the purpose of ascertaining whether the maximum rate of compensation fixed by law for its use is reasonable or otherwise

the income derived therefrom by the owner before it was subjected to legislative control cannot always be accepted as a proper test of value, because the charges then made may have been excessive and unreasonable. And, when the property has been capitalized by issuing stock, neither the market value nor the par value of the stock can be accepted in all cases as a proper criterion of value, because the stock may not represent the money actually invested, and because the property may have been capitalized mainly with reference to its income-producing capacity, on the assumption that it was ordinary private property, which the owner may use as he pleases, without being subject to legislative control. On the other hand, the owner is entitled to the benefit of any appreciation in value above original cost resulting from natural causes, such as improvements made in the vicinity, growth of the town, etc." (Cotting *v.* Kansas City Stockyards Co., 52 Fed. Rep. 851.)

* * * * * * *

"It cannot be said that a corporation, operating a public highway, is entitled as of right, and without reference to the interests of the public, to realize a given per cent upon its capital stock. When the question arises whether the legislature has exceeded its constitutional power in prescribing rates to be charged by a corporation controlling a public highway, stockholders are not the only persons whose rights or interests are to be considered. The rights of the public are not to be ignored. It is alleged here that the rates prescribed are unreasonable and unjust to the company and its stockholders. But that involves an inquiry as to what is reasonable and just for the public. If the establishing of new lines of transportation should cause a diminution in the number of those who need to use a turnpike road, and, consequently, a diminution in the tolls collected, that is not, in itself, a sufficient reason why the corporation operating the road should be allowed to maintain rates that would be unjust to those who must or do use its property. The public cannot properly be subjected to unreasonable rates in order simply that stockholders may earn dividends." (Covington and L. Turnpike Road Co. et. al. *v.* Sanford et. al., 17 Sup. Ct. 205.)

References for Good Will, Going Concern, Going Value and Earning Value. — Following are a number of references quoted from court cases, mainly decisions of the United States Supreme Court, and opinions of prominent engineer writers on the subject.

"But the term 'good will' may be misleading. Lord Eldon said that good will is nothing more than the probability that the old customers will resort to the old place. Crutwell *v.* Lye, 17 Ves. Jr. 335. See Flagg Mfg. Co. *v.* Holway, 178 Mass. 83, 59 N. E. 667. Under any possible definition, it involves an element of personal choice. This

phrase is inappropriate where there can be no choice. So far as the defendants' system is 'practically exclusive,' the element of good will should not be considered." (54 Atl. Rep. 19.)

"The first fact essential to the conclusion of the court below is the valuation of the property devoted to the public uses, upon which the company is entitled to earn a return. That valuation ($608,000) must now be considered. It was made up by adding to the appraisement, in a minute detail of all the tangible property, the sum of $10,000 for 'organization, promotion, etc.,' and $60,000 for '*going concern.*' The latter we understand to be an expression of the *added value of the plant as a whole over the sum of the values of its component parts*, which is attached to it because it is in active and successful operation and earning a return. We express no opinion as to the propriety of including these two items in the valuation of the plant, for the purpose for which it is valued in this case, but leave that question to be considered when it necessarily arises." (Knoxville *v.* Knoxville Water Co., 29 Sup. Ct. Rep. 150.)

"Going value may therefore be defined as the value of a created income, or, to put it in the language of the theory of reproduction, it is the *cost of reproducing a given income.*

"Therefore, in using the theory of reproduction, it is as proper and just to estimate the cost of reproducing the income of the going plant and property as the cost to reproduce its pumps, its pipes or its structures.

"Thoughtful consideration of going value shows that it has no existence without earnings; it is inherently derived from consideration of the efforts to create revenues. Thus, a plant may be losing money and still have a going value, for so long as it earns anything at all it has some revenue which ordinarily it would cost something to reproduce, but when a plant ceases to operate, its structural value may be said to die with its going value."

"Going value, unlike depreciation, has, where it exists at all, been bought largely if not wholly by cash outlay. It is not an unearned increment or a theoretical accretion from causes outside the ledger of the operating plant, except perhaps in one item, viz. opportunity to earn during duplication. After duplication is completed, going value is paid for in cash outlay to meet fixed charges and operating expenses that are not earned, and which often require expenditure to a greater extent than the going value will be worth in years to come." (John W. Alvord, in Am. Waterworks Assoc., June, 1909, page 189.)

"In this connection the writer desires to emphasize the point that equitable net earnings must be dependent upon the characteristics and value of the physical property, and that being the case, there is so intimate a relation between going concern value based upon earnings

and value of physical property that some simple rule might be devised by which going concern value can be estimated as a percentage of the value of the physical property with due consideration of the local conditions. Perhaps a rule of this kind might be devised which would bridge over the inconsistencies and inequalities in the present methods of computing going concern value, harmonize extreme partisan views with regard to this element of value, and eliminate the confusion often arising between going concern value and franchise value." (Pages 235 and 236, John W. Alvord's paper, Am. Waterworks Assoc., June, 1909.)

"Original cost less depreciation, plus what is known as the '*going*' *value.* This latter is of comparatively recent development, but, having much to commend it, now has the sanction of many high authorities. *It is the value such a plant has over and above its physical value, due to the fact that it is not a bare and idle system, but it* is in actual operation, doing business with large numbers of connected customers. It is *something like* the '*good will*' of a business, *but is even more tangible*, as the customers have expended money preparing to use the service and are not likely to discontinue it." (Paper by W. H. Bryan before Engineers' Club of St. Louis, "Going Value as an Element in the Appraisal of Public Utility Properties.")

"Now, what is the property which the district has taken by the power of eminent domain? In the first place, it is a structure, pure and simple, consisting of pipes, pumps, engines, reservoirs, machinery and so forth, with land rights and water rights. As a structure it has value, independent of any use or right to use, where it is — a value probably much less than it cost, unless it can be used where it is; that is, unless there is a right so to use it. Nevertheless, it has value as a structure. But, more than this, it is a structure in actual use; a use remunerative to some extent. It has customers. It is actually engaged in business. It is a *going concern.* The value of the structure is enhanced by the fact that it is being used in, and in fact is essential to, a *going concern business.* We speak sometimes of a *going concern value* as if it is or could be separate and distinct from structure value — so much for structure and so much for going concern. But this is not an accurate statement. The going concern part of it has no existence except as a characteristic of the structure. If no structure, no going concern. If a structure in use, it is a structure whose value is affected by the fact that it is in use. There is only one value. It is the value of the structure as being used. That is all there is of it." (Brunswick and Topham Water District *v.* Maine Water Co., Sup. Jud. Ct. of Maine, Dec 14, 1904, 59 Att. Rep. 639.)

The Wisconsin Railroad Commission, in its recent findings in the case of Payne and others, of Marinette, against the Wisconsin Telephone Company, states:

"If property is devoted to the public use and reasonable care has been exercised in all the phases of its management, but the owners have not yet received a fair return during the earlier years of the operation of the plant in which the property is used for the convenience of the public, the deficits thus incurred must be made up out of later earning in so far as this is commercially possible and expedient."

"It has been held by experts that 'going value' should be allowed as so much per customer, or as a percentage of the receipts, and some have considered it of as great, if not greater, importance than the physical value of the plant. The *Commission holds that the actual reasonably wise expenditure of money towards getting the business of the plant established may be included in the value to be allowed for the purpose of fixing rates.* Since no plant pays at the outset, and the first years of operation are almost invariably accompanied by losses or necessary deficits, the Commission holds that such losses may be said to represent the cost of securing an established or going business, and as such may be included in the value or investment upon which the rates for public service shall be fixed. But the converse of the rule also holds; that is, if a plant has in the past earned more than a reasonable return, possibly through the toleration of excessive rates, the excess over reasonable earnings may, under certain conditions, be subtracted in determining the present value of the plant. That is, a 'going value' may be negative. In the case of the Marinette Telephone Company for example, the Commission found upon its investigation of the financial history of the company that through a period of recent years the company had been enjoying a sufficiently high rate of return to write off the early deficits in so far as such deficits might be allowed as going value."

"We are also of opinion that it is not a case for a valuation of 'good will.' The master combined the franchise value with that of good will, and estimated the total value at $20,000,000.

"The complainant has a monopoly in fact, and a consumer must take gas from it or go without. He will resort to the 'old stand' because he cannot get gas anywhere else. The court below excluded that item and we concur in that action." (Willcox *v.* Consolidated Gas Co., 29 Sup. Ct. Rep. 192.)

"In view of the attitude of the Federal Courts in the Consolidated Gas Case, and the language of the lower court in disallowing the item of 'good will,' which judgment was sustained by the Supreme Court, it is very evident that any attempt to fix arbitrarily a value on such an item in an appraisal is not likely to be supported successfully. The grounds named by the Court are:

"Tangible property has a value apart from any franchise or good will value.

"The franchise, conferring the privilege to be a corporation, to use public property, to be free from competition, and to enjoy many other privileges, has some value apart from tangible property.

"Good will can have no existence as apart from or detached from the franchise conferring the necessary privilege. Such good will (by itself) is not capable of being capitalized and distributed among stockholders.

"Citizens are entitled to have gas (or water) because they pay for it, exactly as they are entitled to have clean streets (and, in the same way, police protection or fire protection), because they pay taxes among other things for that.

"The Court, therefore, finds that *there is no good will value in connection with the gas business in the city of New York*, although it is said, elsewhere in the finding, that it is the best, most favorably located, and most prosperous business of its kind in the country."

(H. E. Riggs's paper, "The Valuation of Public Service Property," pp. 1525–1526. Am. Soc. C. E., November, 1910.)

Judge Lurton, in the Omaha Waterworks Case, says:

"That kind of good will, as suggested in Willcox *v.* Consolidated Gas Co., is of little or no commercial value when the business is, as here, a natural monopoly with which he must deal, whether he will or no."

"'Going Concern' Values. Professor Mead defines this as the value due to the fact that a plant has consumers actually utilizing its product, and that it is in actual and successful operation and has its business developed. This value is the worth of the plant in excess of a similar plant without connections, and constitutes an asset in the consideration of its physical value. Mr. Alvord has used the term 'connected good will' as applicable to this element of value.

"The writer does not concede that 'going concern' is a proper element to consider in the physical value, as it does not represent any part of the cost chargeable to capital, and the physical valuation should be confined to the determination of capital invested.

"It has already been argued that to the physical property as inventoried should be added proper figures to cover organization, legal expense, administration, engineering, and contingencies. All these items are in the nature of additions on account of the fact that the property is a 'going concern.' It is maintained that these costs should carry to the present value column as values, for the reason that all these services rendered in connection with the creation of the property remain, unimpaired in value, as long as the property is operated. When, however, a property ceases to be operated, and is abandoned and dismantled, not only do all these elements absolutely dis-

appear, but also all increments of value by reason of the special use of the property wiped out, and there exist only a lot of partly worn out and partly obsolete scrap values, buildings constructed for a purpose which renders them unfit for other use, and land partly salable at going prices and much that will not sell at all.

"As long as a gas works, a waterworks, or a railroad is in operation and earning, it is a 'going concern,' and all increments which attach to its physical property as a whole continue to exist, even if the physical value of the property is greater than a fair value. That fair value can be determined and reached by means of a negative non-physical value.

"In view of these things, it would seem to be highly improper to add to physical value anything more for 'going concern.' In the final report of U. S. Judge R. W. Tayler, Arbitrator in the Cleveland Street Railway matter, in December, 1909, the following language supports the above contention:

"I allow nothing for going value, except in so far as that is the result of the necessary expenditure of money in building the road, acquiring its land, power houses, and equipment, and putting them into successful operation. The expenditures for these purposes are, and necessarily must be, included in the valuation of the physical property." (H. E. Riggs, "The Valuation of Public Service Corporation Properties," Am. Soc. C. E., November, 1910, p. 1522.)

One of the best examples of the value of "good will" is that of a successful newspaper. The value of the physical plant for producing a Metropolitan daily paper is very small indeed compared with the cash value of the successful paper itself. A newspaper is built up by the ability of its management and its editors; it acquires a large income through its advertising, and its advertising increases with the increase of its circulation. Cases are on record when good daily papers have been sold at public auction and have brought more than a million dollars, the physical plant not being of a value exceeding twenty or thirty per cent of the amount paid.

This excess of value is essentially "good will" rather than "going concern" for the reason that it has a value, quite a large value, which is acquired in competition with other like properties.

"The two factors that determine the actual 'going' value of any concern are its physical plant and its earnings. It has been argued that the earnings of railways cannot be taken into account in making valuations as a basis of rate regulation because present earnings depend on existing rates and the reasonableness of existing rates is the thing to

be determined. But earnings do not depend entirely on rates. They depend also on the amount and nature of the traffic handled. A road with a dense traffic and low rates may have larger gross and net earnings than a road with less traffic per mile and higher rates. Therefore, while commissions may, perhaps, properly disregard earnings in making valuations, because earnings depend on rates, they ought to give weight to density of traffic because nothing could be plainer than that, other things being equal, a road with a heavy traffic has more value per mile than one with a light traffic. The amount of traffic a road has always depends largely on the way it is managed, and a road that has built up a large traffic deserves the wages of good management." (*Railroad Age Gazette*, March 5, 1909.)

"Good will, an established organization, and a loyal esprit de corps are expensive to acquire, in money equivalent, skill, patience and talent; and, while they do not appear on the balance sheet of any railway, are nevertheless things of real value. A manufacturing plant with an experienced administrative organization, trained and disciplined operating staff and an established trade, has a commercial and an economic value in excess of a new and similar concern of corresponding cost and in corresponding physical condition. Is the case affected by the public nature of the service provided by carriers, and by the degree of monopoly they enjoy and exercise? In respect of a railway, good will and organization, as an inducement to patronage, inure to its material advantage; but as enabling efficient service, economical operation and the maintenance of revenues notwithstanding low rates and fares, they are no less an asset in the hands of the public." (*Railroad Age Gazette*, Feb. 5, 1909.)

Mr. Wynkoop Kiersted says:

"A properly designed, well-constructed and thoroughly maintained physical property is the foundation of all values, and for this reason *going concern* value cannot depend wholly upon earning capacity as separate and distinct from the value of the physical property. Moreover, equitable earning capacity depends upon equitable rates, and equitable rates depend primarily upon the fair value of the physical property. Earning capacity and going concern value, franchise value, patronage, good will, and any of the elements of value or the considerations which go to make a successful public utility, cannot endure without a substantial, well-maintained and developing physical property. While, in fact, structural value dies with the loss of earnings, still it is also a fact that there can be no substantial or permanent earning capacity without a substantial, well-maintained, well-organized and well-managed physical property. This is the history of every public utility; it is the history of every piece of property artificially created and subject to the wear and tear of continuous use. Moreover,

two pieces of physical property having precisely the same net earnings, but of wide variation in the matter of the cost of reproduction, may have a variation of going concern value distinct and separate from the variation due to the inequalities of the cost of reproduction." (Page 235 of paper of J. W. Alvord, Am. Waterworks Assoc., June, 1909.)

CHAPTER VIII

DEPRECIATION

The term *depreciation* needs to be defined and described. Webster defines it as the "act or state of lessening worth," and if this definition is assumed to be the correct one, then any and all lessening of worth is to be termed depreciation, whether from age, or decrepitude, obsolescence, inadequacy, wear and tear or lack of any kind of maintenance. At the *time* of an appraisal all these forms of lessening of value have to be given consideration as depreciation, but from an accounting standpoint depreciation is only that deterioration of an object that cannot be made good by repairs, but requires a complete renewal. Obsolescence, inadequacy and supersession, being speculative and prospective, play no part in this form of depreciation, and all other deterioration is to be made good by maintenance and is so charged on the books.

In connection with valuations made as of a certain date, depreciation is used in what might be called its collective sense; that is, all forms of deterioration in value are to be brought under the term, including not only the actual and permanent lessening of value due to age which may be given the specific name of *decrepitude,* but depreciation due to such development of the art as calls for change in apparatus in order to improve the service and bring it to a more modern and efficient standard, termed specifically *obsolescence;* a depreciation due to the growth of business to such an extent that the old apparatus is no longer adequate for the purpose and must be replaced or superseded by larger units, and specifically termed *inadequacy* or *supersession;* the ordinary decrease in value due to *wear* and *tear* owing to the regular use, and, finally, the decrease in value *at the date of appraisal,* due to lack or neglect of repairs that may be necessary to place the apparatus in up-to-date condition, which may be termed *deferred maintenance.*

In an appraisal, the determination of proper rates of depreciation is purely a matter of judgment, as there can be no set rules

any more than there can be any uniform handling of the same form of apparatus. Many engineers and appraisers have assumed rates, and in many cases they agree on a figure which may be described perhaps as a good average to be used on the article under consideration. A rate set for age or decrepitude would be controlled largely by the time at which it is judged that the object will become obsolete, or the time at which it may be inadequate. Rates for these terms are matters of opinion only and can only be made according to the best judgment of the appraiser. *Wear* and *tear* can be found nearly always on the books of the owner, and again *deferred maintenance* is determined by the judgment of the appraiser as to the amount required to put the article in first class condition.

As an example of pure depreciation, the horse is one of the best. He cannot be repaired and can only be renewed; where large numbers are used, as in a street railway, his average age can nearly always be determined from the books of the company.

In fact, railroads generally take the stand that their expenditures for renewals and maintenance have become equalized so that no charge is made on the books for a general depreciation. Thus in case of an appraisal, the last two items, viz. *wear* and *tear* and *deferred maintenance*, at the date would be the only ones necessary to calculate, and these would be represented by an estimate of what it would cost to put the property into thoroughly up-to-date condition. Even then it would be necessary to determine what could be considered an up-to-date condition, and this also would be stated in a percentage of the total value, or of the total value of the various classes of property. No property can ever have a physical value equal to its first cost, that is, basing the prices on those originally paid, but starts to deteriorate and wear out the minute it is installed, and as it can never have repairs or renewals applied all at the same time, there is always some part in disrepair to a greater or less degree. In Chicago this condition has been recognized by the Board of Supervising Engineers of the traction systems, and the board states that after rehabilitating the entire properties, they shall be maintained at 85 per cent of their original cost to construct. This percentage is about as high as it is fair to require a public utility property to be maintained. As this book is written about valuations and not from the bookkeeping standpoint, it is the second or practical definition of *depreciation* that will be made use of.

The truth is that the subject of depreciation and proper charges therefor, correct basis for calculating, and incidentally the handling of the bookkeeping end have not been given due consideration in the past, and have, in fact, but recently been brought seriously to the attention of corporations. A quotation from a decision of the United States Supreme Court in the Knoxville water case will show how seriously it must be considered in the future.

> "A water plant, with all its additions, begins to depreciate in value from the moment of its use. Before coming to the question of profit at all the company is entitled to earn a sufficient sum annually to provide not only for current repairs, but for making good the depreciation and replacing the parts of the property when they come to the end of their life. The company is not bound to see its property gradually waste, without making provision out of earnings for its replacement. It is entitled to see that from earnings the value of the property invested is kept unimpaired, so that, at the end of any given term of years, the original investment remains as it was at the beginning. It is not only the right of the company to make such a provision, but it is its duty to its bond and stock holders, and, in the case of a public service corporation, at least, its plain duty to the public. If a different course were pursued the only method of providing for replacement of property which has ceased to be useful would be the investment of new capital and the issue of new bonds or stocks. This course would lead to a constantly increasing variance between present value and bond and stock capitalization, — a tendency which would inevitably lead to disaster either to the stockholders or to the public, or both. If, however, a company fails to perform this plain duty and to exact sufficient returns to keep the investment unimpaired, whether this is the result of unwarranted dividends upon overissues of securities, or of omission to exact proper prices for the output, the fault is its own. When, therefore, a public regulation of its prices comes under question, the true value of the property then employed for the purpose of earning a return cannot be enhanced by a consideration of the errors in management which have been committed in the past." (Knoxville *v.* Knoxville Water Co., 29 Sup. Ct. 152.)

The following extract from Treasury Decisions on account of Internal Revenue shows how depreciation must be handled in bookkeeping on account of the Special Excise Tax.

DEPRECIATION

83. Depreciation to be an allowable deduction in the return of annual net income of a corporation must be charged off on the ledger

of the corporation, so as to show a reduction in the capital assets of the corporation to the extent of the depreciation claimed.

84. Deduction on account of depreciation of property must be based on lifetime of property, its cost, value, and use, and must be evidenced by a ledger entry and a like reduction in the plant and property account with respect to which the depreciation is claimed.

85. In the case of corporations owning stocks and bonds or other securities, if an annual adjustment of the value of such securities is made and the adjusted values made a matter of ledger entry, the appreciation of such securities as so entered must be accounted for as income, and the depreciation may be deducted from gross income. If no annual adjustment is made, and the securities are carried from year to year as a permanent investment, there will be neither gain nor loss, as to the principal of such securities, until the same shall have been disposed of, when the gain or loss as compared with the original cost shall be prorated, and the amount of such gain or loss apportioned to the years since the incidence of the tax, to wit, January 1, 1909, shall be added to or deducted from the gross income of the year in which the securities were disposed of.

86. Where increase or decrease during the year in the value of real estate acquired in previous years, sold or held for sale, is taken up on the books and the rate cannot be accurately determined with respect to individual years, such increase or decrease may be prorated as provided by regulations in cases of sale of capital assets.

87. Premiums on stocks and bonds arbitrarily charged off on the books of a corporation do not constitute a proper deduction on account of depreciation, unless there shall have been an actual shrinkage in value of such stocks and bonds to the extent of the deduction claimed during the year for which the return is made.

88. Net income on uncompleted contracts may be estimated on the basis of the percentage of the work completed as compared with the contract price of the whole work.

89. Cost of drilling new wells by oil corporations is considered betterments and additions to the capital assets of the corporation. The expense of drilling dry wells may, however, be charged to profit and loss.

90. Discounts, other than bank discounts on notes executed by a corporation, should be segregated from the interest item on the return, and should be included under expenses, item 4.

91. The mere removal of timber by cutting from timber lands, unless the timber is otherwise disposed of through sales or plant operations, is considered simply a change in form of assets. If said timber is disposed of through sales or otherwise, it is to be accounted for in accordance with regulations governing disposition of capital and other assets.

92. Deduction on account of depreciation of property must be based on lifetime of property, its cost, value, and use.

93. Loss due to voluntary removal of buildings, etc., incident to improvements is either a proper charge to the cost of the new additions or to depreciation already provided, as the facts may indicate, but in no case is it a proper deduction in determining net income, except as it may be reflected in the reasonable amount allowable as a deduction for depreciation.

94. Depreciation of company's stock is a loss to the stockholders, but not a loss to the company issuing the same, and therefore not a proper deduction. (Internal Revenue T. D. 1742, Dec. 15, 1911.)

Depreciation in Factories. — Factories are subject to substantially the same rules for depreciation as are public utilities, if there can be said to be rules, and it is just as difficult to fix rates for them. Perhaps the term *depreciation* would better be defined when used in connection with factories as "diminution of value by reason of wear and tear," but it covers many other contingencies as well. In factories, depreciation can, with difficulty, be separated from maintenance, and theoretically one can be used to balance the other. In practice there are, however, plants in which repairs can be said to exactly balance depreciation, one when the life of plant is so short that it has to be renewed entire at very short intervals, and another where the plant is so large that, as in a large railroad system, the renewals or repairs after a while become so equalized that it is not necessary to make any specific charge for depreciation, as replacements will become so regular and the business so permanent as to have little need for such an account. Still, in any factory, no matter how large, unless there are additions to plant the renewals no matter how equalized seldom can be made to keep the plant up to the standard in value, and for this reason surplus earnings should be devoted to such an increase in plant as will always maintain the capital intact, no matter what the depreciation.

In national or municipal plants of any kind, it is seldom considered necessary to have a depreciation account, all renewals are treated as any other expense and covered by the budget each year. This is somewhat of a fallacy and is the cause of many acrimonious disputes between municipal authorities and the advocates of private plants for producing the same output. In some states, the public utilities commissions set a rate of depreciation to be charged on municipal plants.

Depreciation of Railroads. — Opinions on the depreciation properly chargeable to railroads are as many and as widely diversified as are those regarding the physical valuation. Roughly speaking, they may be divided into three classes, of which that of Professor H. C. Adams, Statistician of the Interstate Commerce Commission, represents the first. Quoting from a paper read by Herbert G. Stockwell at the Convention of the Association of Chartered Accountants at Denver:

"'Professor Adams thinks that when carried to the final analysis, the question of the formal depreciation charges to operating expenses is simply a question of what constitutes cost of operation, and the time when such cost shall be acknowledged in the accounts; and that, through the use of that asset in operation, there is created an item in the cost of operations which should be reflected in the accounts when the effect of such depletion takes place; and that a statement of net revenue made without including this element of cost in operating expenses, is an erroneous statement.'

"And again, the opposite view appears to be represented by Mr. Frederick A. Delano, president of the Wabash Railroad, who, in an interesting pamphlet on the 'Application of Depreciation Charges in Railway Accounting,' thinks that there is practically no depreciation in a railroad for the reason that a thorough overhauling of various parts of equipment is made periodically, at which time they are restored to a condition as good as new. He further argues that the appreciation of the value of the railroad, due to the opening up of new territory, and the gradual increase in business, on the average, is more than the depreciation, and points out that the present capitalization of the American railroads on a mileage basis, after deducting the stocks and bonds of one corporation owned by another so as to avoid duplication of figures, is shown by the most recent investigation of the Interstate Commerce Commission to be only slightly more to-day than it was twenty or thirty years ago, which, according to his view, is evidence that many railroads have charged many betterments and improvements either to operating expenses or income account.

"The third view is advanced by Daniel Royes, assistant editor-in-chief of the *Railway Age*, in an article appearing in the April 25, 1908, copy under the title 'Depreciation Electric Railway Accounting.' He recognizes that there is a depreciation, which he describes as follows:

"'Depreciation is that deterioration of the physical property which is not made good by current repairs.' He further states: 'The depreciation of equipment which ultimately results in the need for renewals is an accrued liability, and should have a place in the balance sheet. This being true, the corresponding debits should appear somewhere in the accounts.'

"He thinks, however, that they should be made to income and not to operating expenses, for the reason that depreciation is not an expense, because it may not involve the payment of money, and second, because depreciation goes on independent of operation. Especially is the latter true of that class of depreciation caused by advancement of the arts, sometimes designated as that due to obsolescence or supersession. It seems that his idea is to have set aside a portion of the income to a depreciation reserve account:

"'This need not curtail the payment of dividends, but if dividends are paid, these entries will perform the important function of showing the stockholder that his dividends have come out of capital and not out of profits, and show the bondholder that his security is being impaired.'

"'Some of those who have criticized the Interstate Commerce Commission's order have urged that any arbitrary amount charged off monthly would probably produce reserves within any given time within the contemplation of those estimating the life of the machine, greater than the total value of the machine. In other words, the reserve finally will be greater than the value of the plant. It is not contemplated by the commissioners, as I understand it, that a certain fixed amount once calculated must be adhered to. If any amount of depreciation charged off periodically proves too large, a reduction in the amount can, and should be made in order that the actual depreciation will fit, as nearly as human judgment can make it fit, with the actual physical wearing out of the machine. The president of one of the railroads says that after the first ten years there is practically no depreciation in the equipment, as it is maintained through repairs. Conceding that this is true, then the annual amount of depreciation would be slight, but it is inevitable that it is something, for the reason that sooner or later, each article of equipment is replaced by others.'"

In the classification of operating expenses as prescribed by the Interstate Commerce Commission in accordance with Section 20 of the Act to Regulate Commerce, third revised issue, on page 10, Professor Henry C. Adams, in charge of statistics and accounts, has the following to say:

"*Consideration of Depreciation.* A number of points have been raised by correspondents relative to depreciation that call for the following general statements, all of which bear upon the manner in which depreciation accounts should be treated:

"1. The question of depreciation is fundamentally a question of value, and not a question of maintaining the original capacity, or a standard of operating efficiency, or of keeping full the numbers in equipment series.

"2. The depreciation rules may be worked either on the basis of the value of individual cars and locomotives, or on the basis of the value of series of cars and locomotives. On this point accounting officers are at liberty, until advised to the contrary, to follow whichever method seems to them the more appropriate.

"3. The basis of accumulation — that is to say, the amount to which the percentage rate is applied — ought, in strict theory, to be the original cost. For the current year, however, accounting officers are at liberty to accept original cost (estimated, if not known), record value, or purchase price. The term 'record value' should not be interpreted to mean the value of the equipment as it stands in the capital account (unless that account represents the original value of the equipment on hand), but the actual cost or value of all equipment, regardless of where charged when purchased; and in case purchase price be accepted as the basis of the percentage charge to depreciation, the percentage rate should be limited to the rate required to replace the price paid. A second-hand locomotive, for example, is not called upon to provide for its replacement, when abandoned, by a new locomotive. As stated above, it is values and not locomotives with which depreciation charges deal.

"4. The application of depreciation charges for the current year and subsequent years must not be influenced by the practice of years past. In case property has been appreciated by excessive charges to operating expenses in years past, the value thus placed in the property must be regarded as a permanent undivided asset to the stockholders. On the other hand, in case property has depreciated on account of insufficient charges to operating expenses in years past, this fact must not be permitted to influence the determination of the depreciation rate for the current year.

"5. The monthly charges to operating expenses for 'depreciation' on the several classes of equipment will, of necessity, create or require corresponding liability accounts to which such depreciation may be credited. To that end, carriers will be required, beginning July 1, 1907, to set up an appropriate liability depreciation account for each of the several classes of equipment upon which depreciation is charged."

"These accounts should be designated as follows:

"(*a*) Locomotives — Replacement.
"(*b*) Passenger Train Cars — Replacement.
"(*c*) Freight Train Cars — Replacement.
"(*d*) Electric Equipment of Cars — Replacement.
"(*e*) Floating Equipment — Replacement.
"(*f*) Working Equipment — Replacement.

"To these replacement accounts should be credited monthly the amount of accrued depreciation on each class of equipment, respectively.

Such credits should invariably equal the gross charges to maintenance for depreciation.

"To these several replacement accounts under their appropriate heads should be charged, at cost, all equipment purchased, built or otherwise acquired for the purpose of maintaining the value of a carrier's equipment.

"The monthly charges to operating expenses for 'renewals' of the several classes of equipment will be similarly treated.

"It is not intended that these accounts should be restricted to individual cars or locomotives, or that carriers are not at liberty to renew or replace equipment upon which depreciation has accrued prior to the retirement of such equipment. On the other hand, the several amounts standing to the credit of those replacement accounts should be available to carriers for the purpose of replacement of equipment to the extent of such credits; however, all replacements in excess of such credits must be considered as betterments or additions, and charged either to income or to capital."

In summing up the law bearing upon depreciation in his paper, Mr. Stockwell says:

"(*a*) All common carriers must show depreciation charges in reports to the Interstate Commerce Commission.

"(*b*) In some states public service corporations must show depreciation in their reports to the state authorities.

"(*c*) All corporations may show depreciation as deductions from income, in their reports to the Commissioner of Internal Revenue. While this is not obligatory, it is lawful to make reasonable deductions for depreciation, and will probably be attended to quite universally.

"(*d*) Regarding dividends, as a general rule corporations may pay dividends without providing for depreciation unless it is well known and extensive enough to constitute utter disregard of the maintenance of the property, but caution should be exercised in such payment, for the reason that when such matter is brought into court from now on, the subject of depreciation and the directors' responsibility therefor is likely to be more intelligently presented to and considered by the court."

Definition of Terms, or Classes of Depreciation. — *Decrepitude.* All apparatus gradually wears out by age; it starts to deteriorate the minute it is installed, and such wearing out or deterioration cannot be made good by repairs, but only by complete replacement, say such as a horse. A horse cannot be repaired, but he must be replaced when worn out from old age. The *wear* and *tear* of his feet can be made up by constant repairs, but old age

cannot be repaired. In the same way a car body becomes so racked by use that screws will no longer hold, the wooden parts become so decayed that it is no longer economy to repair it, and the cost of maintenance becomes so high that it is useless to retain the car in service. Such depreciation is termed *decrepitude,* a word somewhat new to the art but exactly describing the true meaning of this class of depreciation.

Obsolescence. This term means a depreciation due to changes or advances in the art which renders a piece of apparatus, or a whole class of it, obsolete and uneconomical of use, as compared with new types which have been developed at a later date and which are of much better efficiency.

This item is ordinarily so much larger than any of the other forms of depreciation that the term of life as dictated by the obsolescence will, in many cases, control the rate of decrease in value. Depreciation due to obsolescence applies particularly to street railway apparatus, for in few industries have the changes and advances been so rapid as in the transportation systems of the country. The fact is that there are few industries that are not affected by obsolescence, even the oldest of them. Machinery in cotton mills, one of the oldest and most stable of the American industries; shoe machinery, and, in fact, all forms of manufactures, — are affected by the changes in the art, the improvement in machinery, and in methods.

One of the best examples of this form of depreciation is the cable railway formerly in use. This form of railway was originally designed for use in the city of San Francisco, on account of the very steep grades of many of the streets in that city. These grades are so steep in many cases as to be quite unsafe for any other form of traction, and the cable is still in use there and probably will remain for some time to come.

Cable traction was adopted in nearly all the large cities of the east some years ago, and after being in use for a few years was replaced by electrically propelled cars. In two places, notably Washington and New York, use was made of the subsurface tube provided for the cable, for placing the electrical conductors, but in all other cities the subsurface structure was torn up and replaced with a much heavier railway track. This change of motor power entailed great expense, which in most cases was calmly added to capital, and in many cases has never been written off.

Inadequacy or Supersession. Depreciation for inadequacy may be described as that lessening in value which takes place by reason of the growth of business, rendering apparatus inadequate for its purpose, and compelling the installation of machinery capable of greater output or capacity. Or supersession may be described as a change of plant due to excessive demands upon it, before it is worn out. For increase in business or growth may render any piece of apparatus or property inadequate for the purpose for which it was originally planned. This applies especially to public service properties, such as street railways, telephones, electric lighting, etc.; cars become too small for their original purpose and too small for the riding public, and when new and larger cars are substituted for the old, additional power supply becomes necessary, and so on down the line the plant must be increased.

Sometimes replacement of public utilities property is forced by city ordinances long before materials are worn out, in which case a large charge for new plant has to be made.

This has been the case with electric light companies to some extent, but more especially so with electric street railways, which in many cases have been forced to invest in new cars and to replace old tracks with new, long before the life of the rails was reached. Sometimes the council has been obsessed with the idea that the railway must use the grooved-girder rail in place of a T rail that may have been installed originally; in other cases the city may have done a large amount of paving and have required the railway company to replace its tracks with new construction all through.

In one large city with which the writer is acquainted, in order to get a guarantee of a low fare the city not only assumed all repairs to paving, but contracted to do the excavating and placing of the concrete base for the track. This was carried out to a limited extent, then the railway company was compelled to build the remainder and go through a long and tedious lawsuit to collect for the construction; and in the ensuing years repairs to pavements have been neglected to such an extent that the company, in many cases of very bad track, has been compelled to go to the expense of repairing the paving at the same time as the track was repaired in order to give the latter proper support. In fact, the whole field of *inadequacy* is well covered by a paper by Mr. Henry E. Riggs before the American Society of Civil Engineers, of which I quote the following fragment from page 1517 of the November, 1910, Proceedings:

> "The rapid development of large cities has compelled electric lines to extend largely. The demands of the people for more frequent and more rapid service, and more modern and larger equipment, have greatly shortened the term of life of power-plant equipment and cars. The rapid development in the art of electricity, the congestion of traffic in streets of cities, the enormous increase of train movements, and the use elsewhere of newer types of cars, have compelled the abandonment of millions of dollars' worth of property and the investment of other millions in new and improved facilities to provide for the increased movements of traffic and increased safety to the public. These changes are not due to the fact that the original installation was defective, but to the demands of the public for frequent, safe and speedy service, demands which are perfectly reasonable. The query is: should a corporation which complies with public demands be compelled to lose capital invested in facilities which have not yet paid for themselves; and which, under a continuance of conditions which existed when they were installed, or any that might then have been anticipated, would normally have a useful life of several more years, and which were abandoned, not by reason of being worn out or unfit for service, but purely because facilities of a more modern type were called for?"

and again, Mr. Riggs says on the same page:

> "Every piece of material and every facility purchased by a company is bought with a definite expectation that it will have a certain life, that during that term of life it will add sufficiently to the earnings to provide a fund for its replacement and earn a profit. No matter whether or not such a reserve is created on the books, this is the theory, and, under it, accident may wipe out certain new property, other property will outlive its expectation and maintain the average life of the entire group of facilities."

The Supreme Court of the state of Oklahoma in the case of State of Oklahoma *v.* Pioneer Telephone Co., said:

> "All the evidence is to the effect that there is at all times going on in a plant of this character a depreciation that cannot be overcome by repair. It is rare that any physical property impaired by time and use can be so repaired as to be the equivalent of the same property new. There comes a time in the life of physical units when they cannot be made usable by repair, and they must be discarded and replaced by new properties which requires the expenditure of capital."

Wear and Tear. This is one of the forms of depreciation ordinarily charged in operating expenses from a bookkeeping standpoint, but one that must be considered when making an appraisal

as having its influence on the plant values. It consists of the normal and natural wear that takes place in all operating plants whether manufacturing plant or the plant of a public utilities. It is the wear such as takes place in the bearings of a machine and which is repaired by re-babbitting; or the wearing off of a commutator on a dynamo, which is repaired by placing a new commutator; or the wear of the tires of a wagon wheel which are repaired by replacing the old tires with new. Accident repairs also come under this heading, and, where excessive or extraordinary, should be charged off gradually, so not to abnormally swell the current operating expenses.

Depreciation due to *wear* and *tear* varies according to the class of apparatus depreciated; in some cases being rapid during early use and slowing up as life proceeds, but with other apparatus the exact reverse takes place in that the deterioration during early life is very little, increasing at the end very rapidly. All kinds of rates and methods of calculation have been laid out for figuring wear and tear, but the rate of depreciation is more or less an arbitrary assumption from whatever point it may be viewed, the main thing being that at the expiration of some number of years the object is worn out to such an extent as to be useless; therefore the straight-line method or depreciation in direct proportion to the assumed length of life is the one most in use. When an appraisal is made for a forced sale, large rates of depreciation must be applied, especially on machine tools, or, in fact, on any factory equipment.

Valuation is an appraisal at some set date and must of course take into consideration all accumulated renewals and all accumulated depreciation of every class.

Again, when any lot of apparatus has been through a cycle of repairs, that is, each piece of the whole lot has been in the shop for repairs, it can be proved mathematically that the present or depreciated value is the original or reproduction cost of the lot, less one half the cost of completely repairing the entire lot, and less any natural or actual deterioration due to decrepitude or obsolescence.

For instance, take an outfit of street car motors; when all have been in the shop and have undergone repairs, and as they go through the shop and start on the second round, it is obvious that their value will be the cost of that part which does not depreciate, plus one half the cost of a complete repair.

Considerable care should be exercised in applying this method of calculating depreciation, and it can only be applied correctly

to those objects which are in so common use as to be constantly going through a cycle of repairs. For instance, arc lamps, meters and transformers could very properly be considered in this class. The trouble, though, with this particular form of apparatus is, that new and improved types are evolved so fast that the investment can only be considered safe or unimpaired when a very large depreciation fund is provided in order to pay for the replacement of these particular appliances in a very short term of life. This depreciation would then be almost wholly covered by obsolescence, and it is only safe to use the cycle form of depreciation on a type of apparatus which has to be thrown away in a few years.

It is possible to arrive at the amount to be allowed for *wear* and *tear* on the basis of a percentage of the original service value of each class of construction never in excess of 50 per cent, but otherwise to be determined in each case by the ratio which the average age of the several units comprising the class of materials in question, exclusive of replacements, bears to the estimated total life of the said class of materials when subjected to wear and tear only, always assuming the highest practicable maintenance. It may be assumed that the life of no class of materials would exceed one hundred years.[1] *Example.* (1) Street cars, if properly maintained, should not reach the scrap heap for, say, 40 years. The present stock of cars in a system may have been purchased as follows: 100 in 1890; 200 in 1896; 100 in 1900, and 50 in 1906; therefore, the average age of all cars in 1909 is 11.44 years. The ratio of this average age to the estimated life, 40 years, is 28.6 per cent; therefore, on the above assumption, in 1909, the cars for the system have depreciated 28.6 per cent of their original service value. (2) Rails reach the scrap heap in, say, 10 years. Assume that the section of the system which was first built was equipped with 1000 rails in 1883, the next section with 2000 rails in 1889, the next section with 2000 rails in 1893; hence the average age of the several units in 1909 would be 19.6 years. The ratio of this average age to the estimated life, 10 years, 196 per cent; but this indicates that all of the original rails have reached the scrap heap (gradually) and that those now in place have been provided gradually and are in all stages of wear from new to scrap value, and hence are subject to an average depreciation of 50 per cent of

[1] This rule is not to be applied to individual pieces of apparatus, where more than one such piece exists in the system — such as to one engine or one car, or one rail — but to engines collectively, or to cars collectively, or to rails collectively.

their original service value. If the units comprising the various purchases differ in value, and hence these purchases are measured in dollars instead of numbers, the average of one dollar's worth should be determined instead of the average age of the various units. (3) Engines, if properly maintained and subject *only* to wear and tear, should not reach the scrap heap for, say, 90 years. Assume that one engine costing $100,000, was purchased in 1889; one costing $150,000 was purchased in 1893, one costing $200,000 was purchased in 1901. The average age in 1909 of one dollar's worth of engine is therefore $13\frac{1}{3}$ years. The ratio of this average age to the estimated life, 90 years, is 14.8 per cent; hence on the above assumption the engines of the system in 1909 have depreciated 14.8 per cent of their original service value. Exceptions to this rule will arise which will require individual study, but in a general way the rule will apply to the general classes of street railway construction.

If betterments are being made at the time of renewals, the cost of betterments should be charged to capital account.

Deferred Maintenance. This is a class of depreciation that is charged to maintenance account in operating expenses and no attention is given it as depreciation except at the time of appraisal, when the condition of repair of all plants must be considered. No appliance or apparatus or object is repaired or put into complete 100 per cent condition the very moment the need of such repairs is manifest; a room may need painting and papering, but the work may be put off until some more convenient time; a street car may need painting, but the company may be short of funds or may be waiting some more propitious moment; a machine tool may need some repairs, yet be able to operate until such time as the owner is ready to put it in condition. All such neglected repairs are known in an appraisal as deferred maintenance.

Deferred maintenance may be computed by estimating the expenditure necessary to put the part into a good serviceable condition.

As it is clearly impossible to keep every piece of apparatus up to the standard or at 100 per cent of its original value, when an appraisal is attempted it must be obvious that there will be considerable apparatus that is not at the time in perfect repair and an estimate will have to be made of its exact condition. This is ordinarily done by estimating what it will cost to put it into completely perfect repair. It is obvious that it will be impossible to

put any piece of apparatus into condition as good as new, although it will doubtless perform its work quite as well as ever, yet there is a deterioration or decrease in value that must be given consideration. Taking any plant as it stands it is probable that it will be impossible to put it into a condition that will exceed 85 per cent or 90 per cent of its original value, and in fact where it becomes necessary to state a condition up to which it will be necessary to maintain a plant, 85 per cent is about as high as it is fair to ask.

The receiver of the Third Avenue Railway properties is said to have declined to obey the order of the Public Service Commission of New York First District, to provide a depreciation fund, on the ground that he makes up all depreciation or deterioration as it occurs. It has been argued that when the property is large enough so that any of the ordinary replacements do not affect the gross income to a great extent, these charges simply become wear and tear, and as such, are legitimately included in the operating expenses. This method is perhaps most commonly used in manufacturing, even more so than with railways, and with some forms of factories where there is not danger that the entire plant, or a large part of it, may be affected by obsolescence, the method perhaps may be as good as any other, but, generally speaking, it seems like putting the charge on the future, and with a railroad, in particular, it is certainly taking an unwarranted advantage and doubtless paying dividends that will not be earned in the future when the full depreciation comes into play.

In a railroad or railway property the two items affecting the depreciation account most largely are track — that is, rails and ties — and cars. Rails are depreciated in two ways, first by wear and next by inadequacy, becoming too light to hold up the increasing weight of the rolling stock; and it is usually the latter cause that governs the life, so called, of the rail. Of course, in the larger cities, rails are ordinarily left in the roadbed until practically worn out, when they are generally replaced by those of a heavier section and usually on a different base, so that the new construction is apt to be much more costly than the old. Rails in such cities ordinarily last only eight or ten years, and therefore form a very large item of repairs, and where they usually have been put down all at the same time and the renewals start, say, ten years after, and are spread over a period of, say, two or three years, it will be seen that the charge for repairs is liable to be excessive during that time, much heavier than necessary if divided up in a

reserve fund for renewals — or depreciation — as advocated here.

Cars, too, are purchased in considerable numbers at first and ordinarily wear out at about the same time, thus causing large charges to operating expenses if charged directly to that account.

It is probably a fact that with some of the very large railroad systems these two items may become so small, comparatively speaking, as to not affect the income materially.

In machine shops and the like, where the equipment consists of lathes, planers, drills, and the ordinary tools making up a shop plant, depreciation would be small and not much affected by obsolescence, and in this case, replacements could be made of one machine at a time, so as not to bear too hard on earnings. In a cotton mill, however, where radical improvements are often made in looms, spinning frames, and other machines of the kind and obsolescence takes place on a whole section, the change of all of one set of machinery is quite often made, not because the old is worn out, but because a new type has been evolved that increases or much improves the production. In such a case, a depreciation fund collected in the past seems much fairer than to make a large charge to operating expense, or to spread the charge over *future* years.

While, as a matter of fact, depreciation does not actually come to a head until a plant or portion thereof is replaced or renewed and settlement has to be made for it; theoretical depreciation is such a method of handling the charges for such a renewal, that the amount may be spread more or less uniformly over a period represented by the life — actual or calculated — of the object or plant under consideration. In some forms of manufacture where profits vary considerably year by year, being quite large one year, and small, or nothing, the next, it has been customary to make heavy charges to depreciation during the year of heavy gains and charge nothing whatsoever during the lean years.

A most admirable statement of the elements of depreciation was made by Professor M. E. Cooley, in the Milwaukee Three-cent Fare Case, as follows:

"Depreciation consisted of several elements which should be understood carefully, Professor Cooley stated, to avoid confusion in the use of the term. These elements were defined by him as follows:

"1. *Depreciation Due to Wear and Tear and Exposure to the Elements.* This is continuous. All elements have a wearing life varying

with the element itself. No element can be completely worn out; it can be worn only to a point below which it becomes unsafe or no longer serves its original function. In practice the average condition of all elements must be maintained at a high percentage of the original cost if the property is to serve its purpose properly. This percentage varies from 75 per cent to 85 per cent of the cost new of the property. The difference between this percentage of from 75 to 85 and the original 100 is a depreciation which is inherent in the property and cannot be dispensed with. It must be met by a sinking fund, or its equivalent, otherwise this part of the original investment becomes lost.

"2. *Depreciation Due to Accidents, a Sudden Depreciation.* An engine or a boiler may be wrecked and with it other machinery. This might, and probably would, involve a considerable expense for repairs or replacement, besides possibly crippling the plant in part. Cars may collide or a car may drop through a bridge. A bridge itself may fall or be carried away by floods. A storm, as a cyclone, may work havoc, entailing costs in excess of those proper to be charged to ordinary maintenance of property.

"3. *Depreciation Due to Inadequacy.* Cars suitable in the past had already been superseded several times by larger and better cars. This has rendered the track, structure and bridges inadequate, and as more power is required to propel the larger cars, the power plants have become inadequate. The public demand is largely responsible for this depreciation due to inadequacy.

"4. *Depreciation Due to Obsolescence.* This, while closely allied to the depreciation due to inadequacy, is different in that it embraces changes due to advance in the art. More efficient and effective machinery has appeared which must be substituted for the old to keep abreast of the times. For example, in steam-engine practice the turbine has come into general use during the past five years and the art of steam turbines is at the beginning. Generators adapted to piston-engine practice are not adapted to steam-turbine practice and must also be changed. Boilers adapted to piston-engine practice must be replaced to carry the higher pressures required. Condensers must also be changed to secure the better vacuum required to realize the full advantage of the steam turbine. Owing to the rapid disappearance of coal beds, the price of fuel must advance, and this presumably will before many years force the adoption of the gas producer and the producer gas engine. Water powers are wisely being developed, but to utilize them requires the scrapping of large parts of the machinery in use at present."

Rules for Depreciating Railways and Lighting Plants in Great Britain

In 1909 the Board of Internal Revenue and the Tramway and Light Railway Association took up the question of depreciation of tramways and lighting properties and promulgated the following arbitrary rules for establishing allowances which should be made in connection with assessing the income taxes.

Permanent Way Life.

"The life of the permanent way is to be taken as 12, 14 or 16 years, according to the traffic thereon. The classification is to be based on the average car mileage per mile of track per annum of the financial year preceding the year of assessment, viz.:

(1) Not exceeding 50,000 car miles per mile of track — 16 years.

(2) Over 50,000 and not exceeding 75,000 car miles per mile of track — 14 years.

(3) Over 75,000 and not exceeding 125,000 car miles per mile of track — 12 years.

(4) Over 125,000 car miles per mile of track — special consideration.

"Where there are special circumstances, such as exceptional gradients and the compulsory use of wood paving, etc., tending to show that the car mileage does not fairly represent the wear and tear of the track, each such case is entitled to special consideration.

Cost of Renewals.

"The cost of renewals, including setts or other paving, but excluding concrete foundations, should be taken at £4400 per mile of single track until the general renewal of the track takes place.

Basis of Computation of Depreciation Allowance.

"No allowance should be made in computing the assessable profits in respect of any expenditure on repairs or maintenance of the permanent way, but the allowance for depreciation should be computed at such a sum per annum as will in the aggregate over the determined life of the permanent way be equal to the cost of renewal as above fixed, plus the estimated repairs for that period:

Cost of renewal per mile as above	£4400
Add, for example:	
Estimated cost of repairs, at £100 per mile per annum, for an undertaking with a life of 16 years	1600
	£6000
Amount to be allowed per annum in lieu of depreciation, one sixteenth	£375

"The amount to be added in respect of ordinary repairs should be determined by taking the actual average expenditure as shown in the accounts of the undertaking for the last three years, or such period less than three years as the undertaking has been in existence.

"Repairs under this head should be understood to include renewals of special track work at junctions and crossovers, which occur at frequent intervals.

Periodical Adjustment.

"Inasmuch as the expenditure on repairs is expected to increase as the track begins to wear, in which case the figure to be adopted under this head which is to be based on past experience will be unsatisfactory, the amount of such estimate should come up for revision at the end of every five years, and an adjustment should be made by increasing or diminishing the allowance as the circumstances require, having regard to the basis of calculation outlined above.

"A strict account should be kept by the corporation and the surveyor of the annual allowances, and of the actual expenditure on repairs and renewals; and at the end of 10 or 15 years (*i.e.* the second or third revision), or at such time as the general renewal of the track shall have taken place, the amount to be annually allowed should be reconsidered and increased or diminished for succeeding years as the ascertained facts shall show to be necessary, provided that under no circumstances shall the allowances for previous years be reopened.

"All expenditure on extensions and improvements should be excluded from the working expenses for income tax purposes, and the necessary additional allowance for depreciation on the lines suggested above (*i.e.* mileage) should at once be allowed on such expenditure, and added to the sum already allowable.

"The allowance of £4400 for renewal of permanent way mentioned above is intended to apply to the overhead trolley system. Special arrangements should be made, on the lines of the foregoing, in the case of the conduit, surface contact, or other system. The number of such cases is very small. As the circumstances vary very considerably in each case, the amount to be allowed for renewals should, in the first instance, be arrived at by arrangement with the chief inspector of taxes.

Cables.

"In addition to repairs, depreciation should be allowed at the rate of 3 per cent per annum on the written-down value.

Overhead Equipment, i.e. Trolley Wires and Connections.

"No depreciation should be allowed; all expenditures on maintenance and renewals should be charged as working expenses, as and when incurred.

Cars and Other Rolling Stock.

"Subject to the ensuing clause, expenditure on maintenance and renewals should be treated as working expenses, and allowed in lieu of depreciation.

"Depreciation, however, should be allowed in lieu of renewals where the circumstances justify such an allowance, provided that a strict account is kept of all renewals, and that if such renewals are charged to revenue account they shall be shown separately in such account and added back in computing the assessable profits.

"The allowance in such case should be 7 per cent per annum on the written-down value.

"In any case the annual expenditure on repairs is to be allowed as a deduction in computing the assessable profits.

General Plant and Machinery.

"All other plant and machinery, including standards, brackets and workshop tools, but excluding loose implements, office furniture and small articles which require frequent renewals, should be bulked together and depreciation allowed thereon at the rate of 5 per cent per annum on the written-down value, in addition to the cost of repairs.

General.

"In all cases where depreciation allowances are granted a strict account should be kept of the annual expenditure on renewals (and repairs in the case of tramway tracks), including replacements due to obsolescence, and of the amounts allowed for depreciation and obsolescence, whether under this arrangement or under any arrangement made prior hereto, and a readjustment should be made for the future, if necessary, at the end of every five years, as detailed under tramways (permanent way), subject, however, to the special provisions applicable to tramways (permanent way).

"Where depreciation allowances other than those for the permanent way of tramways are granted, renewals should be carefully distinguished, and, if charged against revenue, they should be notified to the surveyor, in order that they may be added back in arriving at the income tax liability.

"'Written-down value' means original prime cost, plus subsequent additions, less all allowances actually granted by the revenue in respect of wear and tear.

"These proposals are to take effect for the year 1908–1909, and for years preceding in cases where claims of depreciation are at the present time awaiting settlement.

"The computations necessary for any future adjustment should be duly made, agreed and recorded each year, whether the accounts for the particular year under review show any assessable income tax liable or not.

"Where, in any cases, allowances for depreciation have been made which are now to be discontinued, and they have not been exhausted by renewals already effected, the amount of such unexhausted allowances should be determined by agreement between the surveyor and the corporation, and deducted from the expenditure on future renewals as and when they are effected.

"All cases of dispute should be referred to the board through the chief inspector of taxes."

A well-conceived classification of depreciation is that made by Leonard Metcalf, Civil Engineer, in a paper on "Waterworks Valuation and Fair Rates," etc., read before the American Society of Civil Engineers (see Vol. LXIV, 1909, page 16), from which the following extract is made:

"Broadly speaking, this depreciation may be classified under physical and functional depreciation, and, in certain cases, perhaps, under a third class growing out of expediency or extraordinary external requirements. By physical depreciation is meant the actual wear and tear of operation upon the structure; by functional depreciation, the obsolescence of the structure or its inability, for one reason or another, effectively to meet throughout its life the full requirements of the service. Thus the structure may suffer total depreciation and be thrown out of service, not only because through wear and tear it has reached a condition where further expenditures for repairs or attempts to make it suitable for the required service would not be economical or expedient, but also because recent improvements, or new inventions, new developments and radical changes in service, or the demands of one kind or another involving sweeping changes in the existing plant, make abandonment necessary."

Methods of Calculating Depreciation. — At best, no proper estimate of depreciation can be made without personal inspection and visual examination; even then the result is but an experienced guess backed by broad experience and cultivated judgment. For this reason even experts differ very widely in their estimates unless they can be induced to work together and form their judgments from the same examination and data.

When a factory or plant is shut down and no longer working, apparatus may fairly be depreciated as low as its scrap value for appliances that have passed their usefulness; but when machinery is of modern make and still in good condition, a depreciation to a value of twenty or twenty-five per cent is about as low as it is fair to go.

New machinery that has to be valued for a forced sale has often been appraised at one half its cost new.

When a plant is still in operation, a "going concern," and has been in working order for a series of years such as would be longer than the estimated length of life of the apparatus or machinery in use, it would not be fair to depreciate the values to scrap just because the estimated life had been exceeded. But where such appliances and machinery or other objects have been in daily use, a salvage value of twenty or twenty-five per cent would be much more fair as the lowest price at which such a machine should be appraised.

One of the most completely worked out schemes for the salvage or minimum service value of structures and equipment is that contained in a *Memorandum Regarding Values used for Lives of Structures and Equipment* gotten out by the Joint Engineering Department of the Wisconsin Commissions: following is an abstract from the memorandum:

Power Plant		Minimum Service Value, per Cent of Reproduction Cost
Steam plant of all kinds, shafting and pipe covering		25 per cent
Electric generators, motors and rotaries	Modern type	20 per cent
	Obsolete type	15 per cent
Static transformers (including regulators and compensators), station type		40 per cent
Switchboard and wiring complete	Modern type	45 per cent
	Obsolete type	35 per cent
Switchboard instruments, alone	Modern type	80 per cent
	Obsolete type	60 per cent
Storage batteries		35 per cent
Lighting arresters, station type		50 per cent

Electric Light and Railway	
Copper wire, weatherproof; Lead-covered cable, underground and overhead	Weight of copper

Electric Light and Railway — *Continued*	Minimum Service Value, per Cent of Reproduction Cost
Poles both wood and iron, anchors and guys . . .	20 per cent
Service transformers	25 per cent
Arc lamps and span equipment	20 per cent
Service and watt meters	80 per cent
Telephone Equipment	
Power plant and wire	25 per cent
Poles	20 to 40 per cent
Iron wire	10 per cent
Copper	25 per cent
Lead-covered cable, both overhead and underground	25 per cent
Subscribers' sets	30 per cent
Gas Plant	
Purifiers, old type, according to style and condition	25 per cent
Consumers' meters	70 per cent

It may be assumed that no class of apparatus will last more than one hundred years; that nothing must be depreciated to a price lower than its scrap or salvage value, and that no plant or class of appliances can be maintained at 100 per cent of its full value new.

Straight Line Method. By far the most commonly used method of depreciating machinery and plant is that known as the *straight line.* By this method a length of life of the particular apparatus under consideration is estimated and determined by the best experience and good judgment available, then this length of life divided into 100 will give the rate at which the depreciation is to be figured; that is, the rate per cent per annum, or the annual rate at which the depreciation is to be computed. If the life of an engine is assumed to be twenty years, then its cost new will be depreciated one twentieth of such cost each year, or at the rate of five per cent per annum on the original cost new.

While this method is in itself an assumption, yet it does away with all side assumptions or guesses as to how much the machine is depreciating each individual year. It is the method used by many of the public utility commissions, by the courts, most generally by public accountants, and by far the greater majority of engineers.

The Method of Diminishing Values. This plan is the same as the straight line method, except that the depreciation is not cal-

culated in proportion to the length of life, but at a rate per cent assumed as correct for the particular object or machine, computed on the diminishing value of the apparatus. That is, for example, if a machine cost originally $1000 and the rate of depreciation is assumed as 10 per cent, then at the end of the first year the original cost will be reduced 10 per cent, or to $900; the next year 10 per cent will be deducted from the value at the end of the previous year and the new value becomes $810, and so on throughout its life. It will be seen that this depreciation gradually diminishes, and there will never be a time when the value reaches zero. The table following on pages 172 to 175 shows the rate of decrease, or rate at any year at various percentages.

Sinking Fund Method. This plan is based upon the assumption that a fund is to be laid aside annually to cover the depreciation. At the *end of the year* a certain amount of money, as determined from sinking fund tables, is deposited at interest, this interest is annually compounded and the regular contribution is added to it, the whole sum drawing interest at the regular rate for the ensuing year when, the interest for the year just passed having been added, the regular contribution is again made; and so it continues until the assumed period of life of the object or apparatus has come to an end, when there should be on deposit a sum equal to the first cost of the apparatus less the scrap or salvage value.

Two factors have to be predetermined in this case, first the length of life it is presumed that the object to be depreciated will last in good serviceable condition or until its usefulness has disappeared; second, the rate of interest that can be secured for the deposits, the interest to be compounded each year at the time the annual contribution is made.

EFFECT OF DEPRECIATION AT DIFFERENT RATES ON DIMINISHING VALUES

	1%	$1\frac{1}{4}$%	$1\frac{1}{2}$%	2%	$2\frac{1}{2}$%	3%	4%
0	1.000,000	1.000,000	1.000,000	1.000,000	1.000,000	1.000,000	1.000,000
1	.990,000	.987,500	.985,000	.980,000	.975,000	.970,000	.960,000
2	.980,100	.975,156	.970,225	.960,400	.950,625	.940,900	.921,600
3	.970,299	.962,967	.955,671	.941,192	.926,859	.912,673	.884,736
4	.960,596	.950,930	.941,336	.922,368	.903,688	.885,292	.849,346
5	**.950,990**	**.939,043**	**.927,216**	**.903,921**	**.881,099**	**.858,734**	**.815,372**
6	.941,480	.927,305	.913,308	.885,843	.859,068	.832,972	.782,757
7	.932,066	.915,714	.899,608	.868,126	.837,591	.807,982	.751,477
8	.922,745	.904,267	.886,114	.850,763	.816,652	.783,743	.721,389
9	.913,517	.892,964	.872,822	.833,748	.796,235	.760,231	.692,534
10	**.904,382**	**.881,802**	**.859,730**	**.817,073**	**.776,329**	**.737,424**	**.664,832**
11	.895,338	.870,779	.846,834	.800,732	.756,921	.715,301	.638,239
12	.886,385	.859,895	.834,131	.784,717	.737,998	.693,842	.612,709
13	.877,522	.849,146	.821,619	.769,023	.719,548	.673,026	.588,201
14	.868,746	.838,532	.809,295	.753,643	.701,559	.652,836	.564,673
15	**.860,059**	**.828,050**	**.797,155**	**.738,570**	**.684,020**	**.633,250**	**.542,086**
16	.851,458	.817,699	.785,198	.723,798	.666,920	.614,253	.520,402
17	.842,943	.807,478	.773,420	.709,323	.650,247	.595,825	.499,586
18	.834,514	.797,385	.761,819	.695,136	.633,991	.577,950	.479,603
19	.826,169	.787,417	.750,391	.681,233	.618,141	.560,612	.460,419
20	**.817,907**	**.777,574**	**.739,135**	**.667,609**	**.602,572**	**.543,794**	**.442,002**
21	.809,728	.767,855	.728,048	.654,257	.587,620	.527,300	.424,322
22	.801,631	.758,257	.717,128	.641,171	.572,930	.511,655	.407,349
23	.793,615	.748,778	.706,371	.628,348	.558,606	.496,306	.391,055
24	.785,678	.739,419	.695,775	.615,781	.544,641	.481,416	.375,413
25	**.777,822**	**.730,176**	**.685,338**	**.603,466**	**.531,025**	**.466,974**	**.360,396**
26	.770,043	.721,049	.675,058	.591,396	.517,749	.452,965	.345,980
27	.762,343	.712,036	.664,932	.579,568	.504,806	.439,376	.332,141
28	.754,720	.703,135	.654,958	.567,977	.492,185	.426,194	.318,855
29	.747,172	.694,346	.645,134	.556,618	.479,881	.413,408	.306,101
30	**.739,701**	**.685,667**	**.635,457**	**.545,485**	**.467,884**	**.401,006**	**.293,857**

EFFECT OF DEPRECIATION AT DIFFERENT RATES ON DIMINISHING VALUES—*Continued*

	1%	$1\frac{1}{4}$%	$1\frac{1}{2}$%	2%	$2\frac{1}{2}$%	3%	4%
31	.732,304	.677,096	.625,926	.534,576	.456,187	.388,976	.282,103
32	.724,981	.668,632	.616,538	.523,885	.444,782	.377,307	.270,819
33	.717,732	.660,274	.607,290	.513,408	.433,663	.365,988	.259,987
34	.710,555	.652,021	.598,181	.503,140	.422,812	.355,009	.249,588
35	**.703,450**	**.643,870**	**.589,210**	**.493,078**	**.412,243**	**.344,359**	**.239,605**
36	.696,416	.635,822	.580,372	.483,216	.401,937	.334,029	.230,021
37	.689,452	.627,874	.571,667	.473,552	.391,891	.324,007	.220,820
38	.682,558	.620,026	.563,093	.464,081	.382,095	.314,286	.211,986
39	.675,733	.612,276	.554,648	.454,800	.372,544	.304,857	.203,507
40	**.668,972**	**.604,623**	**.546,321**	**.445,701**	**.363,232**	**.295,711**	**.195,366**
41	.662,283	.597,065	.538,126	.436,787	.354,151	.286,840	.187,552
42	.655,661	.589,602	.530,054	.428,052	.345,298	.278,235	.180,050
43	.649,105	.582,232	.522,104	.419,491	.336,666	.269,888	.172,848
44	.642,614	.574,954	.514,273	.411,102	.328,250	.261,792	.165,935
45	**.636,188**	**.567,767**	**.506,559**	**.402,880**	**.320,044**	**.253,939**	**.159,298**
46	.629,827	.560,670	.498,960	.394,823	.312,043	.246,321	.152,927
47	.623,529	.553,662	.491,476	.386,927	.304,242	.238,932	.146,810
48	.617,294	.546,741	.484,105	.379,189	.296,635	.231,763	.140,938
49	.611,122	.539,907	.476,843	.371,605	.289,219	.224,810	.135,301
50	**.605,011**	**.533,158**	**.469,689**	**.364,171**	**.281,988**	**.218,065**	**.129,889**
60	**.547,157**	**.470,139**	**.403,805**	**.297,554**	**.218,915**	**.160,806**	**.086,352**
70	**.494,839**	**.414,569**	**.347,163**	**.243,124**	**.169,950**	**.118,582**	**.057,410**
80	**.447,524**	**.365,568**	**.298,467**	**.198,650**	**.131,937**	**.087,445**	**.038,168**
90	**.404,732**	**.322,358**	**.256,601**	**.162,311**	**.102,427**	**.064,484**	**.025,375**
100	**.366,033**	**.284,256**	**.220,607**	**.132,620**	**.079,517**	**.047,552**	**.016,870**

EFFECT OF DEPRECIATION AT DIFFERENT RATES ON DIMINISHING VALUES

	5 %	6 %	7½ %	10 %	12½ %	15 %	20 %
0	1.000,000	1.000,000	1.000,000	1.000,000	1.000,000	1.000,000	1.000,000
1	.950,000	.940,000	.925,000	.900,000	.875,000	.850,000	.800,000
2	.902,500	.883,600	.855,626	.810,000	.765,625	.722,500	.640,000
3	.857,375	.830,584	.791,453	.729,000	.669,922	.614,125	.512,000
4	.814,506	.780,749	.732,094	.656,100	.586,182	.522,006	.409,600
5	**.773,781**	**.733,904**	**.677,187**	**.590,490**	**.512,909**	**.443,705**	**.327,680**
6	.735,092	.689,870	.626,398	.531,441	.448,796	.377,149	.262,144
7	.698,337	.648,478	.579,418	.478,297	.392,696	.320,577	.209,715
8	.663,420	.609,569	.535,962	.430,467	.343,609	.272,490	.167,772
9	.630,249	.572,995	.495,764	.387,420	.300,658	.231,617	.134,218
10	**.598,737**	**.538,616**	**.458,582**	**.348,678**	**.263,076**	**.196,874**	**.107,372**
11	.568,800	.506,299	.424,188	.313,811	.230,191	.167,343	.085,899
12	.540,360	.475,921	.392,374	.282,429	.201,418	.142,232	.068,720
13	.513,342	.447,366	.362,946	.254,186	.176,240	.120,905	.054,976
14	.487,675	.420,524	.335,725	.228,768	.154,210	.102,770	.043,981
15	**.463,291**	**.395,292**	**.310,546**	**.205,891**	**.134,934**	**.087,354**	**.035,184**
16	.440,127	.371,575	.287,255	.185,302	.118,067	.074,251	.028,148
17	.418,200	.349,281	.265,711	.166,772	.103,309	.063,113	.022,518
18	.397,214	.328,324	.245,782	.150,095	.090,395	.053,646	.018.014
19	.377,354	.308,624	.227,349	.135,085	.079,096	.045,599	.014,412
20	**.358,486**	**.290,107**	**.210,297**	**.121,577**	**.069,209**	**.038,760**	**.011,529**
21	.340,562	.272,701	.194,525	.109,419	.060,558	.032,946	.009,223
22	.323,533	.256,358	.179,936	.098,477	.052,988	.028,004	.007,379
23	.307,357	.240,958	.166,441	.088,629	.046,365	.023,803	.005,903
24	.291,989	.226,501	.153,957	.079,766	.040,569	.020,233	.004,722
25	**.277,390**	**.212,911**	**.142,411**	**.071,790**	**.035,498**	**.017,198**	**.003,778**
26	.263,520	.200,136	.131,730	.064,611	.031,061	.014,618	.003,022
27	.250,344	.188,128	.121,850	.058,150	.027,178	.012,425	.002,418
28	.237,827	.176,840	.112,711	.052,335	.023,781	.010,562	.001,934
29	.225,935	.166,230	.104,258	.047,101	.020,808	.008,977	.001,547
30	**.214,639**	**.156,256**	**.096,439**	**.042,391**	**.018,207**	**.007,631**	**.001,238**

EFFECT OF DEPRECIATION AT DIFFERENT RATES ON DIMINISHING VALUES — *Continued*

	5 %	6 %	7½ %	10 %	12½ %	15 %	20 %
31	.203,908	.146,881	.089,207	.038,152	.015,931	.006,486	.000,991
32	.193,713	.138,069	.082,517	.034,337	.013,940	.005,514	.000,793
33	.184,028	.129,786	.076,328	.030,904	.012,197	.004,687	.000,635
34	.174,827	.122,000	.070,604	.027,814	.010,672	.003,985	.000,508
35	**.166,086**	**.114,680**	**.065,309**	**.025,033**	**.009,338**	**.003,388**	**.000,407**
36	.157,782	.107,800	.060,411	.022,530	.008,171	.002,880	.000,327
37	.149,892	.101,330	.055,880	.020,277	.007,150	.002,448	.000,260
38	.142,396	.095,250	.051,690	.018,250	.006,256	.002,080	.000,211
39	.135,277	.089,534	.047,812	.016,424	.005,474	.001,767	.000,166
40	**.128,512**	**.084,162**	**.044,225**	**.014,781**	**.004,790**	**.001,502**	**.000,133**
41	.122,086	.079,113	.040,909	.013,303	.004,191	.001,277	.000,107
42	.115,982	.074,367	.037,841	.011,973	.003,667	.001,085	.000,086
43	.110,183	.069,906	.035,004	.010,776	.003,209	.000,923	.000,069
44	.104,674	.065,702	.032,379	.009,699	.002,808	.000,785	.000,056
45	**.099,440**	**.061,760**	**.029,952**	**.008,730**	**.002,457**	**.000,668**	**.000,045**
46	.094,468	.058,055	.027,708	.007,857	.002,150	.000,569	.000,036
47	.089,745	.054,572	.025,620	.007,072	.001,881	.000,483	.000,029
48	.085,257	.051,299	.023,699	.006,363	.001,646	.000,410	.000,023
49	.080,994	.048,223	.021,923	.005,726	.001,440	.000,348	.000,018
50	**.076,945**	**.045,331**	**.020,281**	**.005,154**	**.001,260**	**.000,296**	**.000,014**
60	.046,070	.024,416	.009,300	.001,797	.000,332	.000,058	.000,002
70	.027,584	.013,151	.004,265	.000,627	.000,087	.000,011	—
80	.016,515	.007,083	.001,956	.000,218	.000,023	.000,002	—
90	.009,888	.003,815	.000,897	.000,076	.000,006	—	—
100	.005,921	.002,055	.000,411	.000,027	.000,002	—	—

The compound interest tables shown on pages 177 to 184, as Table I, will supply the only figures that are tedious to compute, and from the figures shown in this table, all SINKING FUND and PRESENT WORTHS can be calculated by the following formulas :

Let r = rate of interest expressed decimally, as, .03,

l = life in years,

n = number of years or term, or age,

$(1+r)^n$ = compound interest,

then

To find the *present worth* P of \$1.00 at compound interest for a term of years :

$$P = \frac{1}{(1+r)^n}$$

To find the *present worth* P_1 of an annual investment of \$1.00 for a term of years :

$$P_1 = \frac{1 - \frac{1}{(1+r)^n}}{r}$$

To find the investment per annum at compound interest S that will produce \$1.00 in any term of years, commonly called a SINKING FUND:

$$S = \frac{r}{(1+r)^n - 1}$$

To find the amount that an annual investment F of \$1.00 at compound interest will produce in a term of years:

$$F = \frac{(1+r)^n - 1}{r}$$

Given the *life* in years that an object is expected to last ; the *age* in years of the object at the time it is desired to determine its *condition per cent*, and the percentage which the sinking fund is drawing, then

$$\textit{condition per cent} = 100 - \left[\frac{(1+r)^n - 1}{(1+r)^l - 1}\right]$$

Tables follow on pages 185 to 189 which show the condition per cent at 2, $2\frac{1}{2}$, 3, $3\frac{1}{2}$, 4 per cent interest on the sinking fund.

TABLE I. COMPOUND INTEREST

Amount that $1.00 will Accumulate in any Number of Years up to 25. Formula $(1+r)^n$

1 to 25 Years	1%	$1\frac{1}{4}$%	$1\frac{1}{2}$%	$1\frac{3}{4}$%	2%	$2\frac{1}{2}$%	3%	1 to 25 Years
1	1.01	1.0125	1.015	1.0175	1.02	1.025	1.03	1
2	1.0201	1.02515625	1.030225	1.03530625	1.0404	1.050625	1.0609	2
3	1.030301	1.03797070	1.04567838	1.05342411	1.061208	1.07689063	1.092727	3
4	1.04060401	1.05094534	1.06136355	1.07185903	1.08243216	1.10381289	1.12550881	4
5	**1.05101005**	**1.06408215**	**1.07728400**	**1.09061656**	**1.10408080**	**1.13140821**	**1.15927407**	**5**
6	1.06152015	1.07738318	1.09344326	1.10970235	1.12616242	1.15969342	1.19405230	6
7	1.07213535	1.09085047	1.10984491	1.12912215	1.14868567	1.18868575	1.22987387	7
8	1.08285671	1.10448610	1.12649259	1.14888178	1.17165938	1.21840290	1.26677008	8
9	1.09368527	1.11829218	1.14338998	1.16898721	1.19509257	1.24886297	1.30477318	9
10	**1.10462213**	**1.13227083**	**1.16054083**	**1.18944449**	**1.21899442**	**1.28008454**	**1.34391638**	**10**
11	1.11566835	1.14642422	1.17794894	1.21025977	1.24337431	1.31208666	1.38423387	11
12	1.12682503	1.16075452	1.19561817	1.23143931	1.26824179	1.34488882	1.42576089	12
13	1.13809328	1.17526395	1.21355244	1.25298950	1.29360663	1.37851104	1.46853371	13
14	1.14947421	1.18995475	1.23175573	1.27491682	1.31947876	1.41297382	1.51258972	14
15	**1.16096896**	**1.20482918**	**1.25023207**	**1.29722786**	**1.34586834**	**1.44829817**	**1.55796742**	**15**
16	1.17257864	1.21988955	1.26898555	1.31992935	1.37278571	1.48450562	1.60470644	16
17	1.18430443	1.23513817	1.28802033	1.34302811	1.40024142	1.52161826	1.65284763	17
18	1.19614748	1.25057739	1.30734064	1.36653111	1.42824625	1.55965872	1.70243306	18
19	1.20810895	1.26620961	1.32695075	1.39044540	1.45681117	1.59865019	1.75350605	19
20	**1.22019004**	**1.28203723**	**1.34685501**	**1.41477820**	**1.48594740**	**1.63861644**	**1.80611123**	**20**
21	1.23239194	1.29806270	1.36705783	1.43953681	1.51566634	1.67958185	1.86029457	21
22	1.24471586	1.31428848	1.38756370	1.46472871	1.54597967	1.72157140	1.91610341	22
23	1.25716302	1.33071709	1.40837715	1.49036146	1.57689926	1.76461068	1.97358651	23
24	1.26973465	1.34735105	1.42950281	1.51644279	1.60843725	1.80872595	2.03279411	24
25	**1.28243200**	**1.36419294**	**1.45094535**	**1.54298054**	**1.64060599**	**1.85394410**	**2.09377793**	**25**

TABLE I. COMPOUND INTEREST — *Continued*

Amount that $1.00 will Accumulate in any Number of Years from 26 to 50. Formula $(1 + r)^n$

26 to 50 Years	1 %	$1\frac{1}{4}$ %	$1\frac{1}{2}$ %	$1\frac{3}{4}$ %	2 %	$2\frac{1}{2}$ %	3 %	26 to 50 Years
26	1.29525631	1.38124535	1.47270953	1.56998269	1.67341811	1.90029270	2.15659127	26
27	1.30820888	1.39851092	1.49480018	1.59745739	1.70688648	1.94780002	2.22128901	27
28	1.32129097	1.41599230	1.51722218	1.62541290	1.74102421	1.99649502	2.28792768	28
29	1.33450388	1.43369221	1.53998051	1.65385762	1.77584469	2.04640739	2.35656551	29
30	**1.34784892**	**1.45161336**	**1.56308022**	**1.68280013**	**1.81136158**	**2.09756758**	**2.42726247**	**30**
31	1.36132740	1.46975853	1.58652642	1.71224913	1.84758882	2.15000677	2.50008035	31
32	1.37494068	1.48813051	1.61032432	1.74221349	1.88454059	2.20375694	2.57508276	32
33	1.38869009	1.50673214	1.63447918	1.77270223	1.92223140	2.25885086	2.65233524	33
34	1.40257699	1.52556629	1.65899637	1.80372452	1.96067603	2.31532213	2.73190530	34
35	**1.41660276**	**1.54463587**	**1.68388132**	**1.83528970**	**1.99988955**	**2.37320519**	**2.81386245**	**35**
36	1.43076878	1.56394382	1.70913954	1.86740727	2.03988734	2.43253532	2.89827833	36
37	1.44507647	1.58349312	1.73477663	1.90008689	2.08068509	2.49334870	2.98522668	37
38	1.45952724	1.60328678	1.76079828	1.93333841	2.12229879	2.55568242	3.07478348	38
39	1.47412251	1.62332787	1.78721025	1.96717184	2.16474477	2.61957448	3.16702698	39
40	**1.48886373**	**1.64361946**	**1.81401841**	**2.00159734**	**2.20803966**	**2.68506384**	**3.26203779**	**40**
41	1.50375237	1.66416471	1.84122868	2.03662530	2.25220046	2.75219043	3.35989893	41
42	1.51878989	1.68496677	1.86884712	2.07226624	2.29724447	2.82099520	3.46069589	42
43	1.53397779	1.70602885	1.89687982	2.10853090	2.34318936	2.89152008	3.56451677	43
44	1.54931757	1.72735421	1.92533302	2.14543019	2.39005314	2.96380808	3.67145227	44
45	**1.56481075**	**1.74894614**	**1.95421301**	**2.18297522**	**2.43785421**	**3.03790328**	**3.78159584**	**45**
46	1.58045885	1.77080797	1.98352621	2.22117728	2.48661129	3.11385086	3.89504372	46
47	1.59626344	1.79294306	2.01327910	2.26004789	2.53634351	3.19169713	4.01189503	47
48	1.61222608	1.81535485	2.04347829	2.29959872	2.58707039	3.27148956	4.13225188	48
49	1.62834834	1.83804679	2.07413046	2.33984170	2.63881179	3.35327680	4.25621944	49
50	**1.64463182**	**1.86102237**	**2.10524242**	**2.38078893**	**2.69158803**	**3.43710872**	**4.38390602**	**50**

TABLE I. COMPOUND INTEREST—*Continued*

Amount that $1.00 will Accumulate in any Number of Years from 51 to 75. Formula $(1+r)^n$

51 to 75 Years	1 %	$1\frac{1}{4}$ %	$1\frac{1}{2}$ %	$1\frac{3}{4}$ %	2 %	$2\frac{1}{2}$ %	3 %	51 to 75 Years
51	1.66108	1.88429	2.13682	2.42245	2.74542	3.52304	4.51542	51
52	1.67769	1.90784	2.16887	2.46485	2.80033	3.61111	4.65089	52
53	1.69447	1.93169	2.20141	2.50798	2.85633	3.70139	4.79041	53
54	1.71141	1.95583	2.23443	2.55187	2.91346	3.79392	4.93412	54
55	**1.72852**	**1.98028**	**2.26794**	**2.59653**	**2.97173**	**3.88877**	**5.08215**	**55**
56	1.74581	2.00503	2.30196	2.64197	3.03117	3.98599	5.23461	56
57	1.76327	2.03010	2.33649	2.68820	3.09179	4.08564	5.39165	57
58	1.78090	2.05547	2.37154	2.73525	3.15362	4.18778	5.55340	58
59	1.79871	2.08117	2.40711	2.78311	3.21670	4.29248	5.72000	59
60	**1.81670**	**2.10718**	**2.44322**	**2.83182**	**3.28103**	**4.39979**	**5.89160**	**60**
61	1.83486	2.13352	2.47987	2.88137	3.34665	4.50978	6.06835	61
62	1.85321	2.16019	2.51707	2.93180	3.41358	4.62253	6.25040	62
63	1.87174	2.18719	2.55482	2.98310	3.48186	4.73809	6.43791	63
64	1.89046	2.21453	2.59314	3.03531	3.55149	4.85654	6.63105	64
65	**1.90937**	**2.24221**	**2.63204**	**3.08843**	**3.62252**	**4.97796**	**6.82998**	**65**
66	1.92846	2.27024	2.67152	3.14247	3.69497	5.10241	7.03488	66
67	1.94774	2.29862	2.71160	3.19747	3.76887	5.22997	7.24593	67
68	1.96722	2.32735	2.75227	3.25342	3.84425	5.36072	7.46331	68
69	1.98689	2.35644	2.79355	3.31036	3.92114	5.49473	7.68721	69
70	**2.00676**	**2.38590**	**2.83546**	**3.36829**	**3.99956**	**5.63210**	**7.91782**	**70**
71	2.02683	2.41572	2.87799	3.42723	4.07955	5.77291	8.15536	71
72	2.04710	2.44592	2.92116	3.48721	4.16114	5.91723	8.40002	72
73	2.06757	2.47649	2.96498	3.54824	4.24436	6.06516	8.65202	73
74	2.08825	2.50745	3.00945	3.61033	4.32925	6.21679	8.91158	74
75	**2.10913**	**2.53879**	**3.05459**	**3.67351**	**4.41584**	**6.37221**	**9.17893**	**75**

TABLE I. COMPOUND INTEREST—*Continued*

Amount that $1.00 will Accumulate in any Number of Years from 76 to 100. Formula $(1+r)^n$

76 to 100 Years	1 %	$1\frac{1}{4}$ %	$1\frac{1}{2}$ %	$1\frac{3}{4}$ %	2 %	$2\frac{1}{2}$ %	3 %	76 to 10 Years
76	2.13022	2.57053	3.10041	3.73780	4.50415	6.53151	9.45429	76
77	2.15152	2.60266	3.14692	3.80321	4.59424	6.69480	9.73792	77
78	2.17304	2.63519	3.19412	3.86977	4.68612	6.86217	10.03006	78
79	2.19477	2.66813	3.24203	3.93749	4.77984	7.03372	10.33096	79
80	**2.21672**	**2.70148**	**3.29066**	**4.00639**	**4.87544**	**7.20957**	**10.64089**	**80**
81	2.23888	2.73525	3.34002	4.07650	4.97295	7.38981	10.96012	81
82	2.26127	2.76944	3.39012	4.14784	5.07241	7.57455	11.28892	82
83	2.28388	2.80406	3.44097	4.22043	5.17386	7.76392	11.62759	83
84	2.30672	2.83911	3.49259	4.29429	5.27733	7.95801	11.97642	84
85	**2.32979**	**2.87460**	**3.54498**	**4.36944**	**5.38288**	**8.15696**	**12.33571**	**85**
86	2.35309	2.91053	3.59815	4.44590	5.49054	8.36089	12.70578	86
87	2.37662	2.94692	3.65213	4.52371	5.60035	8.56991	13.08695	87
88	2.40038	2.98375	3.70691	4.60287	5.71235	8.78416	13.47956	88
89	2.42439	3.02105	3.76251	4.68342	5.82660	9.00376	13.88395	89
90	**2.44863**	**3.05881**	**3.81895**	**4.76538**	**5.94313**	**9.22886**	**14.30047**	**90**
91	2.47312	3.09705	3.87623	4.84877	6.06200	9.45958	14.72948	91
92	2.49785	3.13576	3.93438	4.93363	6.18324	9.69607	15.17137	92
93	2.52283	3.17496	3.99339	5.01997	6.30690	9.93847	15.62651	93
94	2.54806	3.21464	4.05329	5.10782	6.43304	10.18693	16.09530	94
95	**2.57354**	**3.25483**	**4.11409**	**5.19720**	**6.56170**	**10.44160**	**16.57816**	**95**
96	2.59927	3.29551	4.17580	5.28815	6.69293	10.70264	17.07551	96
97	2.62527	3.33671	4.23844	5.38070	6.82679	10.97021	17.58777	97
98	2.65152	3.37842	4.30202	5.47486	6.96333	11.24447	18.11540	98
99	2.67803	3.42065	4.36655	5.57067	7.10259	11.52558	18.65887	99
100	**2.70481**	**3.46340**	**4.43205**	**5.66816**	**7.24465**	**11.81372**	**19.21863**	**100**

TABLE I. COMPOUND INTEREST — *Continued*

Amount that $1.00 will Accumulate in any Number of Years up to 25. Formula $(1+r)^n$

1 to 25 Years	$3\frac{1}{2}$ %	4 %	$4\frac{1}{2}$ %	5 %	$5\frac{1}{2}$ %	6 %	7 %	1 to 25 Years
1	1.035	1.04	1.045	1.05	1.055	1.06	1.07	1
2	1.071225	1.0816	1.092025	1.1025	1.113025	1.1236	1.1449	2
3	1.10871788	1.124864	1.14116613	1.157625	1.17424138	1.191016	1.225043	3
4	1.14752300	1.16985856	1.19251860	1.21550625	1.23882465	1.26247696	1.31079601	4
5	**1.18768631**	**1.21665290**	**1.24618194**	**1.27628156**	**1.30696001**	**1.33822558**	**1.40255173**	**5**
6	1.22925533	1.26531902	1.30226012	1.34009564	1.37884281	1.41851911	1.50073035	6
7	1.27227926	1.31593178	1.36086183	1.40710042	1.45467916	1.50363026	1.60578148	7
8	1.31680904	1.36856905	1.42210061	1.47745544	1.53468651	1.59384807	1.71818618	8
9	1.36289735	1.42331181	1.48609514	1.55132822	1.61909427	1.68947896	1.83845921	9
10	**1.41059876**	**1.48024428**	**1.55296942**	**1.62889463**	**1.70814446**	**1.79084770**	**1.96715136**	**10**
11	1.45996972	1.53945406	1.62285305	1.71033936	1.80209240	1.89829856	2.10485195	11
12	1.51106866	1.60103222	1.69588143	1.79585633	1.90120749	2.01219647	2.25219159	12
13	1.56395606	1.66507351	1.77219610	1.88564914	2.00577390	2.13292826	2.40984500	13
14	1.61869452	1.73167645	1.85194492	1.97993160	2.11609146	2.26090396	2.57853415	14
15	**1.67534883**	**1.80094351**	**1.93528244**	**2.07892818**	**2.23247649**	**2.39655819**	**2.75903154**	**15**
16	1.73398604	1.87298125	2.02237015	2.18287459	2.35526270	2.54035168	2.95216375	16
17	1.79467555	1.94790050	2.11337681	2.29201832	2.48480215	2.69277279	3.15881521	17
18	1.85748920	2.02581652	2.20847877	2.40661923	2.62146627	2.85433915	3.37993228	18
19	1.92250132	2.10684918	2.30786031	2.52695020	2.76564691	3.02559950	3.61652754	19
20	**1.98978886**	**2.19112314**	**2.41171402**	**2.65329771**	**2.91775749**	**3.20713547**	**3.86968446**	**20**
21	2.05943147	2.27876807	2.52024116	2.78596259	3.07823415	3.39956360	4.14056237	21
22	2.13151158	2.36991879	2.63365201	2.92526072	3.24753703	3.60353742	4.43040174	22
23	2.20611448	2.46471554	2.75216635	3.07152376	3.42615157	3.81974966	4.74052986	23
24	2.28332849	2.56330416	2.87601383	3.22509994	3.61458990	4.04893464	5.07236695	24
25	**2.36324498**	**2.66583633**	**3.00543446**	**3.38635494**	**3.81339235**	**4.29187072**	**5.42743264**	**25**

TABLE I. COMPOUND INTEREST — *Continued*

Amount that $1.00 will Accumulate in any Number of Years from 26 to 50. Formula $(1 + r)^n$

26 to 50 Years	$3\frac{1}{2}$ %	4 %	$4\frac{1}{2}$ %	5 %	$5\frac{1}{4}$ %	6 %	7 %	26 to 50 Years
26	2.44595856	2.77246978	3.14067901	3.55567269	4.02312893	4.54938296	5.80735292	26
27	2.53156711	2.88336858	3.28200956	3.73345632	4.24440102	4.82234594	6.21386763	27
28	2.62017196	2.99870332	3.42969999	3.92012914	4.47784307	5.11168670	6.64883836	28
29	2.71187798	3.11865145	3.58403649	4.11613560	4.72412444	5.41838790	7.11425705	29
30	**2.80679370**	**3.24339751**	**3.74531813**	**4.32194238**	**4.98395129**	**5.74349117**	**7.61225504**	**30**
31	2.90503148	3.37313341	3.91385745	4.53803949	5.25806861	6.08810064	8.14511290	31
32	3.00670759	3.50805875	4.08998104	4.76494147	5.54726238	6.45338668	8.71527080	32
33	3.11194235	3.64838110	4.27403018	5.00318854	5.85236181	6.84058988	9.32533975	33
34	3.22086033	3.79431634	4.46636154	5.25334797	6.17424171	7.25102528	9.97811354	34
35	**3.33359045**	**3.94608899**	**4.66734781**	**5.51601537**	**6.51382501**	**7.68608679**	**10.67658148**	**35**
36	3.45026611	4.10393255	4.87737846	5.79181614	6.87208538	8.14725200	11.42394219	36
37	3.57102543	4.26808986	5.09686049	6.08140694	7.25005008	8.63608712	12.22361814	37
38	3.69601132	4.43881345	5.32621921	6.38547729	7.64880283	9.15425235	13.07927141	38
39	3.82537171	4.61636599	5.56589908	6.70475115	8.06948699	9.70350749	13.99482041	39
40	**3.95925972**	**4.80102063**	**5.81636454**	**7.03998871**	**8.51330877**	**10.28571794**	**14.97445784**	**40**
41	4.09783381	4.99306145	6.07810094	7.39198815	8.98154076	10.90286101	16.02266989	41
42	4.24125799	5.19278391	6.35161548	7.76158756	9.47552550	11.55703267	17.14425678	42
43	4.38970202	5.40049527	6.63743818	8.14966693	9.99667940	12.25045463	18.34435475	43
44	4.54334160	5.61651508	6.93612290	8.55715028	10.54649677	12.98548191	19.62845959	44
45	**4.70235855**	**5.84117568**	**7.24824843**	**8.98500779**	**11.12655409**	**13.76461083**	**21.00245176**	**45**
46	4.86694110	6.07482271	7.57441961	9.43425818	11.73851456	14.59048748	22.47262338	46
47	5.03728404	6.31781562	7.91526849	9.90597109	12.38413287	15.46591673	24.04570702	47
48	5.21358898	6.57052824	8.27145557	10.40126965	13.06526017	16.39387173	25.72890651	48
49	5.39606459	6.83334937	8.64367107	10.92133313	13.78384948	17.37750403	27.52992997	49
50	**5.58492686**	**7.10668335**	**9.03263627**	**11.46739979**	**14.54196120**	**18.42015427**	**29.45702506**	**50**

TABLE I. COMPOUND INTEREST — *Continued*

Amount that $1.00 will Accumulate in any Number of Years from 51 to 75. Formula $(1 + r)^n$

51 to 75 Years	$3\frac{1}{2}$%	4%	$4\frac{1}{2}$%	5%	$5\frac{1}{2}$%	6%	7%	51 to 75 Years
51	5.78040	7.39095	9.43910	12.04077	15.34177	19.52536	31.51902	51
52	5.98271	7.68659	9.86386	12.64281	16.18557	20.69689	33.72535	52
53	6.19211	7.99405	10.30774	13.27495	17.07577	21.93870	36.08612	53
54	6.40883	8.31381	10.77159	13.93870	18.01494	23.25502	38.61215	54
55	**6.63314**	**8.64637**	**11.25631**	**14.63563**	**19.00576**	**24.65032**	**41.31500**	**55**
56	6.86530	8.99222	11.76284	15.36741	20.05108	26.12934	44.20705	56
57	7.10559	9.35191	12.29217	16.13578	21.15389	27.69710	47.30155	57
58	7.35428	9.72599	12.84532	16.94257	22.31735	29.35893	50.61265	58
59	7.61168	10.11503	13.42336	17.78970	23.54481	31.12046	54.15554	59
60	**7.87809**	**10.51963**	**14.02741**	**18.67919**	**24.83977**	**32.98769**	**57.94643**	**60**
61	8.15382	10.94041	14.65864	19.61315	26.20596	34.96695	62.00268	61
62	8.43921	11.37803	15.31828	20.59380	27.64729	37.06497	66.34286	62
63	8.73458	11.83315	16.00760	21.62349	29.16789	39.28887	70.98686	63
64	9.04029	12.30648	16.72794	22.70467	30.77212	41.64620	75.95595	64
65	**9.35670**	**12.79874**	**17.48070**	**23.83990**	**32.46459**	**44.14497**	**81.27286**	**65**
66	9.68419	13.31068	18.26733	25.03190	34.25014	46.79367	86.96196	66
67	10.02313	13.84311	19.08936	26.28349	36.13390	49.60129	93.04930	67
68	10.37394	14.39684	19.94839	27.59766	38.12126	52.57737	99.56275	68
69	10.73703	14.97271	20.84606	28.97755	40.21793	55.73201	106.53214	69
70	**11.11283**	**15.57162**	**21.78414**	**30.42643**	**42.42992**	**59.07593**	**113.98939**	**70**
71	11.50177	16.19448	22.76442	31.94775	44.76356	62.62049	121.96865	71
72	11.90434	16.84226	23.78882	33.54513	47.22556	66.37772	130.50646	72
73	12.32099	17.51595	24.85932	35.22239	49.82296	70.36038	139.64191	73
74	12.75222	18.21659	25.97799	36.98351	52.56323	74.58200	149.41684	74
75	**13.19855**	**18.94525**	**27.14700**	**38.83269**	**55.45420**	**79.05692**	**159.87602**	**75**

TABLE I. COMPOUND INTEREST — *Continued*

Amount that $1.00 will Accumulate in any Number of Years from 76 to 100. Formula $(1 + r)^n$

76 to 100 Years	3½ %	4 %	4½ %	5 %	5½ %	6 %	7 %	76 to 100 Years
76	13.66050	19.70306	28.36861	40.77432	58.50418	83.80034	171.06734	76
77	14.13862	20.49119	29.64520	42.81304	61.72191	88.82836	183.04205	77
78	14.63347	21.31083	30.97923	44.95369	65.11662	94.15806	195.85500	78
79	15.14564	22.16327	32.37330	47.20137	68.69803	99.80754	209.56485	79
80	**15.67574**	**23.04980**	**33.83010**	**49.56144**	**72.47643**	**105.79599**	**224.23439**	**80**
81	16.22439	23.97179	35.35245	52.03951	76.46263	112.14375	239.93079	81
82	16.79224	24.93066	36.94331	54.64149	80.66807	118.87238	256.72595	82
83	17.37997	25.92789	38.60576	57.37356	85.10482	126.00472	274.69677	83
84	17.98827	26.96500	40.34302	60.24224	89.78558	133.56500	293.92554	84
85	**18.61786**	**28.04360**	**42.15846**	**63.25435**	**94.72379**	**141.57890**	**314.50033**	**85**
86	19.26948	29.16535	44.05559	66.41707	99.93360	150.07364	336.51535	86
87	19.94392	30.33196	46.03809	69.73792	105.42995	159.07806	360.07143	87
88	20.64195	31.54524	48.10980	73.22482	111.22859	168.62274	385.27643	88
89	21.36442	32.80705	50.27474	76.88606	117.34617	178.74010	412.24578	89
90	**22.11218**	**34.11933**	**52.53711**	**80.73037**	**123.80021**	**189.46451**	**441.10298**	**90**
91	22.88610	35.48411	54.90128	84.76688	130.60922	200.83238	471.98019	91
92	23.68712	36.90347	57.37183	89.00523	137.79272	212.88232	505.01880	92
93	24.51616	38.37961	59.95356	93.45549	145.37132	225.65526	540.37012	93
94	25.37423	39.91479	62.65148	98.12826	153.36675	239.19458	578.19603	94
95	**26.26233**	**41.51139**	**65.47079**	**103.03468**	**161.80192**	**253.54625**	**618.66975**	**95**
96	27.18151	43.17184	68.41698	108.18641	170.70102	268.75903	661.97663	96
97	28.13286	44.89872	71.49574	113.59573	180.08958	284.88457	708.31499	97
98	29.11751	46.69466	74.71305	119.27552	189.99451	301.97765	757.89704	98
99	30.13663	48.56245	78.07514	125.23929	200.44420	320.09631	810.94984	99
100	**31.19141**	**50.50495**	**81.58852**	**131.50126**	**211.46864**	**339.30208**	**867.71633**	**100**

TABLE II. CONDITION PER CENT

Depreciation Calculated on a Sinking Fund Basis at 2%

Formula: condition per cent $= 100 - \left[\dfrac{(1+r)^n - 1}{(1+r)^l - 1}\right]$

Years Life

2	3	4	5	6	8	10	12	14	15	16	17	18	20	25	30	33	40	45	50	Age
51	67	76	81	84	88	92	93	94	94	95	95	95	96	97	98	98	98	99	99	1
—	44	51	61	68	76	82	85	87	88	89	90	91	92	94	95	96	97	97	98	2
	—	26	41	51	65	72	77	81	82	84	85	86	88	91	92	93	95	96	96	3
		—	21	35	52	62	69	74	76	78	79	81	83	87	90	91	93	94	95	4
			—	**17**	**40**	**52**	**61**	**67**	**70**	**72**	**74**	**76**	**79**	**84**	**87**	**89**	**91**	**93**	**94**	**5**
				—	26	42	53	60	63	66	68	71	74	80	84	86	90	91	93	6
					14	32	45	53	57	60	63	65	69	77	82	84	88	90	91	7
					—	22	36	46	50	54	57	60	65	73	79	81	86	88	90	8
						11	27	39	43	48	51	54	60	69	76	79	84	86	88	9
						—	**18**	**31**	**32**	**41**	**45**	**49**	**55**	**66**	**73**	**76**	**82**	**85**	**87**	**10**
							9	24	30	35	39	43	50	62	70	73	80	83	86	11
							—	16	22	28	33	37	45	58	67	70	78	81	84	12
								8	15	21	27	32	39	54	64	68	76	80	83	13
								—	8	14	20	25	34	50	61	65	74	78	81	14
									—	**7**	**13**	**19**	**29**	**46**	**57**	**63**	**71**	**76**	**80**	**15**
										—	7	13	23	42	54	60	69	74	78	16
											—	7	17	37	50	57	67	72	76	17
												—	12	33	47	54	65	70	75	18
													6	29	44	50	62	68	73	19
													—	**20**	**40**	**47**	**60**	**66**	**71**	**20**
														15	36	44	57	64	70	21
														10	33	40	55	62	68	22
														5	29	37	52	60	66	23
														—	25	34	50	58	64	24
															21	**30**	**47**	**55**	**62**	**25**
															17	27	44	53	60	26
															12	23	42	51	58	27
															9	20	39	49	56	28
															5	16	36	46	54	29
															—	**12**	**33**	**44**	**52**	**30**
																8	30	41	50	31
																4	27	38	48	32
																—	23	36	46	33
																	20	33	43	34
																	17	**30**	**41**	**35**
																	15	27	39	36
																	10	25	36	37
																	7	22	33	38
																	4	19	31	39
																	—	**17**	**29**	**40**
																		13	26	41
																		10	24	42
																		7	21	43
																		3	18	44
																		—	**15**	**45**
																			12	46
																			9	47
																			6	48
																			3	49
																			—	**50**

55	60	65	70	75	80	85	90	95	100	Age
99	99	99	99	99	99	99	99	99	99	1
98	98	98	99	99	99	99	99	99	99	2
97	97	98	98	98	98	99	99	99	99	3
96	96	97	97	98	98	98	98	99	99	4
95	**95**	**96**	**97**	**97**	**97**	**98**	**98**	**98**	**98**	**5**
94	94	95	96	96	97	97	97	98	98	6
93	93	94	95	95	96	97	97	97	98	7
92	92	93	94	95	96	96	97	97	97	8
91	91	93	93	94	95	96	96	96	97	9
90	**90**	**92**	**93**	**94**	**94**	**95**	**96**	**96**	**97**	**10**

TABLE III. CONDITION PER CENT

Depreciation Calculated on a Sinking Fund Basis at $2\frac{1}{2}\%$

$$\text{Formula: condition per cent} = 100 - \left[\frac{(1+r)^n - 1}{(1+r)^l - 1}\right]$$

Years Life																				
2	3	4	5	6	8	10	12	14	15	16	17	18	20	25	30	33	40	45	50	Age
51	68	76	81	85	88	91	93	94	95	95	95	96	96	97	98	98	99	99	99	1
—	34	52	61	69	77	82	86	88	89	90	90	91	92	94	95	96	97	98	98	2
	—	26	42	54	65	73	78	82	83	85	85	86	88	91	93	94	95	96	97	3
		—	21	38	52	63	70	75	78	80	80	82	84	88	91	92	94	95	96	4
			—	**21**	**40**	**53**	**62**	**68**	**71**	**73**	**75**	**77**	**79**	**85**	**88**	**90**	**92**	**94**	**95**	**5**
				—	27	43	53	61	64	67	69	71	75	81	86	87	90	92	94	6
					14	33	45	54	58	61	64	66	70	78	83	85	89	91	92	7
					—	22	37	47	52	55	58	61	66	75	80	83	87	89	91	8
						11	28	40	45	49	52	55	61	71	77	80	85	88	90	9
						—	**19**	**32**	**38**	**43**	**46**	**50**	**56**	**67**	**75**	**78**	**83**	**86**	**88**	**10**
							10	25	30	35	40	44	51	64	72	75	81	85	87	11
							—	17	23	29	34	38	44	60	69	73	80	83	86	12
								8	16	22	27	33	49	56	66	70	78	81	85	13
								—	8	15	21	26	35	52	62	67	76	80	83	14
									—	**8**	**14**	**20**	**30**	**49**	**59**	**65**	**73**	**78**	**82**	**15**
										—	8	13	24	43	56	62	71	76	80	16
											—	7	19	39	53	59	69	75	79	17
												—	14	35	50	56	67	73	77	18
													7	30	46	52	65	71	75	19
													—	**25**	**42**	**49**	**62**	**69**	**74**	**20**
														20	38	46	60	67	72	21
														15	34	43	57	65	71	22
														11	31	40	55	63	69	23
														6	26	36	52	60	67	24
														—	**23**	**32**	**50**	**58**	**65**	**25**
															18	29	47	56	63	26
															14	25	44	53	62	27
															9	21	41	51	59	28
															5	17	38	49	57	29
															—	**13**	**35**	**46**	**55**	**30**
																9	32	44	53	31
																7	28	41	51	32
																—	25	38	49	33
																	23	36	46	34
																	19	**33**	**44**	**35**
																	15	30	42	36
																	11	27	39	37
																	8	24	36	38
																	4	21	34	39
																	—	**17**	**31**	**40**
																		14	28	41
																		11	25	42
																		7	23	43
																		4	20	44
																		—	**16**	**45**
																			13	46
																			10	47
																			7	48
																			4	49
																			—	**50**

55	60	65	70	75	80	85	90	95	100	Age
99	99	99	99	99	99	99	99	99	99	1
98	98	99	99	99	99	99	99	99	99	2
97	98	98	98	99	99	99	99	99	99	3
96	97	97	98	98	98	99	99	99	99	4
95	**96**	**97**	**97**	**98**	**98**	**98**	**98**	**99**	**99**	**5**
94	95	96	97	97	97	98	98	98	99	6
93	94	95	96	96	97	97	98	98	98	7
92	94	94	95	96	96	97	97	98	98	8
91	93	94	95	95	96	97	97	97	98	9
91	**92**	**93**	**94**	**95**	**96**	**96**	**97**	**97**	**97**	**10**

TABLE IV. CONDITION PER CENT

Depreciation Calculated on a Sinking Fund Basis at 3%

$$\text{Formula: condition per cent} = 100 - \left[\frac{(1+r)^n - 1}{(1+r)^l - 1}\right]$$

Years Life																				
2	3	4	5	6	8	10	12	14	15	16	17	18	20	25	30	33	40	45	50	Age
51	68	76	81	85	89	91	93	94	95	95	95	96	96	97	98	98	99	99	99	1
—	34	51	62	69	77	83	86	88	89	90	91	91	92	94	96	96	97	98	98	2
	—	36	42	52	65	72	78	82	84	85	86	87	89	92	94	94	96	97	97	3
		—	21	35	54	64	70	76	77	79	81	82	84	89	91	92	94	96	96	4
			—	18	40	54	62	69	71	74	76	77	80	86	89	90	93	94	95	5
				—	27	43	55	62	65	68	70	72	76	82	87	88	91	93	94	6
					14	32	46	55	59	62	65	67	71	79	84	86	90	92	93	7
					—	22	37	48	52	56	59	62	67	76	81	84	88	91	92	8
						12	29	41	46	50	53	57	62	72	79	82	87	89	91	9
						—	19	33	38	43	47	51	57	69	76	79	85	88	90	10
							10	25	31	37	41	45	52	65	73	77	83	86	89	11
							—	17	23	30	35	40	47	61	70	74	81	85	87	12
								9	16	23	28	33	42	58	67	72	79	83	86	13
								—	8	15	21	27	36	53	64	69	77	82	85	14
									—	8	14	21	30	49	61	66	75	80	84	15
										—	7	14	25	45	57	64	73	78	82	16
											—	8	19	41	54	61	71	76	81	17
												—	13	36	51	57	69	75	79	18
													7	31	47	54	67	73	78	19
													—	26	43	51	64	71	77	20
														21	40	48	62	69	75	21
														16	36	45	60	67	73	22
														11	32	41	57	65	71	23
														6	28	37	54	63	70	24
														—	24	34	52	61	68	25
															19	30	49	59	66	26
															14	26	46	56	64	27
															10	22	44	54	61	28
															5	18	40	51	60	29
															—	14	37	49	58	30
																9	34	46	55	31
																5	30	44	54	32
																—	27	41	51	33
																	24	38	49	34
																	20	35	46	35
																	17	32	44	36
																	12	28	41	37
																	8	25	39	38
																	4	22	36	39
																	—	19	33	40
																		16	30	41
																		11	27	42
																		8	24	43
																		4	21	44
																		—	18	45
																			14	46
																			11	47
																			7	48
																			4	49
																			—	50

55	60	65	70	75	80	85	90	95	100	Age
99	99	99	99	99	99	99	99	99	99	1
99	99	99	99	99	99	99	99	99	99	2
98	98	98	99	99	99	99	99	99	99	3
97	97	98	98	98	99	99	99	99	99	4
96	97	97	98	98	98	99	99	99	99	5
95	96	97	97	98	98	98	99	99	99	6
94	95	96	97	97	98	98	98	99	99	7
93	95	95	96	97	97	98	98	98	99	8
93	94	95	96	96	97	97	98	98	98	9
92	93	94	95	96	96	97	97	98	98	10

TABLE V. CONDITION PER CENT

Depreciation Calculated on a Sinking Fund Basis at $3\frac{1}{2}\%$

Formula: condition per cent $= 100 - \left[\dfrac{(1+r)^n - 1}{(1+r)^l - 1}\right]$

Years Life 2	3	4	5	6	8	10	12	14	15	16	17	18	20	25	30	33	40	45	50	Age
51	68	76	81	85	89	91	97	94	95	95	96	96	97	97	98	98	98	99	99	1
—	35	52	62	69	78	83	86	89	90	91	91	92	93	95	96	97	98	98	98	2
	—	26	42	53	67	74	79	82	84	85	87	87	89	92	94	95	96	97	98	3
		—	21	37	53	64	71	76	78	80	81	83	85	89	92	93	95	96	97	4
			—	**19**	**41**	**55**	**63**	**70**	**72**	**75**	**77**	**78**	**81**	**86**	**90**	**91**	**94**	**95**	**96**	**5**
				—	28	44	55	63	66	69	71	73	77	83	87	89	92	94	95	6
					14	33	47	56	60	63	66	68	72	80	85	87	91	93	94	7
					—	23	38	49	53	57	60	63	68	77	82	85	89	91	93	8
						12	29	41	46	51	55	58	64	74	80	83	88	90	92	9
						—	**20**	**33**	**39**	**44**	**48**	**52**	**59**	**70**	**77**	**81**	**86**	**89**	**91**	**10**
							11	31	32	37	43	47	54	66	75	78	84	88	90	11
							—	17	24	30	35	40	48	62	72	76	83	86	89	12
								8	16	23	29	34	43	59	69	73	81	85	88	13
								—	8	15	22	28	38	55	66	71	79	83	87	14
									—	**8**	**15**	**22**	**32**	**51**	**63**	**68**	**77**	**82**	**85**	**15**
										—	8	15	26	46	60	65	75	80	84	16
											—	7	20	42	56	62	73	79	83	17
												—	13	37	53	59	71	77	81	18
													6	32	49	56	69	75	80	19
													—	**27**	**45**	**53**	**67**	**73**	**78**	**20**
														22	41	50	64	72	77	21
														18	37	46	62	70	75	22
														12	33	43	59	68	74	23
														6	29	39	57	65	72	24
														—	**25**	**36**	**54**	**63**	**70**	**25**
															20	32	51	61	68	26
															15	26	48	59	67	27
															10	23	45	56	65	28
															5	19	42	54	63	29
															—	**14**	**40**	**51**	**61**	**30**
																10	36	49	59	31
																5	33	46	56	32
																—	29	43	54	33
																	25	40	52	34
																	21	**37**	**49**	**35**
																	17	34	46	36
																	13	30	44	37
																	9	27	41	38
																	4	24	38	39
																	—	**20**	**35**	**40**
																		17	32	41
																		13	29	4
																		8	26	43
																		5	23	44
																		—	**19**	**45**
																			15	46
																			8	47
																			8	48
																			4	49
																			—	**50**

55	60	65	70	75	80	85	90	95	100	Age
99	99	99	99	99	99	99	99	99	99	1
99	99	99	99	99	99	99	99	99	99	2
98	98	99	99	99	99	99	99	99	99	3
98	98	98	99	99	99	99	99	99	99	4
97	**97**	**98**	**98**	**98**	**99**	**99**	**99**	**99**	**99**	**5**
96	97	97	98	98	98	99	99	99	99	6
95	96	97	97	98	98	98	99	99	99	7
95	95	96	97	97	98	98	98	99	99	8
94	95	96	96	97	98	98	98	99	99	9
93	**94**	**95**	**96**	**97**	**97**	**98**	**98**	**98**	**99**	**10**

TABLE VI. CONDITION PER CENT

Depreciation Calculated on a Sinking Fund Basis at 4%

Formula: condition per cent $= 100 - \left[\dfrac{(1+r)^n - 1}{(1+r)^l - 1}\right]$

Years Life

2	3	4	5	6	8	10	12	14	15	16	17	18	20	25	30	33	40	45	50	Age
51	68	76	82	85	89	92	93	95	95	95	96	96	97	98	98	99	99	99	99	1
—	35	52	62	69	78	83	86	89	90	91	91	92	93	95	96	97	98	98	99	2
	—	26	42	53	66	74	79	83	84	86	87	88	90	93	94	95	97	97	98	3
		—	22	36	54	65	72	77	79	81	82	83	86	90	92	94	96	97	97	4
			—	**18**	**41**	**55**	**64**	**70**	**73**	**75**	**77**	**79**	**82**	**87**	**90**	**92**	**94**	**96**	**96**	**5**
				—	28	45	56	64	67	70	72	74	78	84	88	90	93	95	96	6
					14	34	47	57	61	64	67	69	73	81	86	88	92	94	95	7
					—	23	39	50	54	58	61	64	69	78	84	86	90	92	94	8
						12	30	42	47	52	55	59	64	75	81	84	89	92	93	9
						—	**20**	**34**	**40**	**45**	**50**	**53**	**60**	**71**	**79**	**82**	**87**	**90**	**92**	**10**
							10	26	33	38	43	47	55	68	76	79	86	89	91	11
							—	18	25	31	37	41	50	64	73	77	84	88	90	12
								9	17	24	30	35	44	60	70	75	83	86	89	13
								—	9	16	23	29	39	56	67	72	81	85	88	14
									—	**8**	**16**	**22**	**33**	**52**	**64**	**70**	**79**	**84**	**87**	**15**
										—	8	15	27	48	61	67	77	82	86	16
											—	8	20	43	58	64	75	80	84	17
												—	14	38	54	61	73	79	83	18
													7	34	51	58	71	77	82	19
													—	**28**	**47**	**55**	**69**	**75**	**80**	**20**
														23	43	52	66	74	79	21
														18	39	48	64	72	78	22
														12	35	45	61	70	76	23
														6	30	41	59	68	74	24
														—	**26**	**37**	**56**	**66**	**73**	**25**
															21	33	53	64	71	26
															16	29	50	61	69	27
															11	25	47	59	67	28
															6	20	44	56	65	29
															—	**15**	**41**	**54**	**63**	**30**
																11	38	51	61	31
																5	34	48	59	32
																—	30	45	57	33
																	26	42	54	34
																	22	**39**	**52**	**35**
																	18	36	49	36
																	14	33	46	37
																	10	29	44	38
																	5	26	41	39
																	—	**21**	**38**	**40**
																		18	35	41
																		14	31	42
																		9	28	43
																		5	24	44
																		—	**21**	**45**
																			17	46
																			13	47
																			9	48
																			4	49
																			—	**50**

55	60	65	70	75	80	85	90	95	100	Age
99	99	99	99	99	99	99	99	99	99	1
99	99	99	99	99	99	99	99	99	99	2
98	99	99	99	99	99	99	99	99	99	3
98	98	99	99	99	99	99	99	99	99	4
97	**98**	**98**	**98**	**99**	**99**	**99**	**99**	**99**	**99**	**5**
97	97	98	98	99	99	99	99	99	99	6
96	97	97	98	98	99	99	99	99	99	7
95	96	97	97	98	98	99	99	99	99	8
95	96	96	97	98	98	98	99	99	99	9
94	**95**	**96**	**97**	**97**	**98**	**98**	**99**	**99**	**99**	**10**

The *sinking fund* method is coming more into use all the time in connection with public utility properties, as a deposit of actual funds that can be called upon at any time to cover the cost of renewal inspires confidence in the public mind that the property will by kept up to the standard.

One argument against depositing this fund outside the company's business is, that in case the company wishes to borrow money it is a legitimate query as to why it does not make use of the fund already on deposit.

Another argument against depositing funds outside is that ordinarily more money can be made by keeping the money in use than in depositing it in a fund even at compound interest. Again, in case a property is being appraised for establishment of rates, the value of funds deposited for renewals should not be included, as these funds have already been earned from the public, and including them in a valuation would be requiring the public to pay dividends on money already paid in by it.

In case no fund is deposited but the money is kept in the business as an accumulating surplus against which depreciation or renewals can be charged, it is policy to divide the surplus account into renewal fund surplus and general surplus. In large corporations doing a great amount of business and with many plants in widespread localities it is not customary to establish funds for depreciation to which regular deposits shall be made, but to appropriate certain amounts each year to pay for renewals and replacements, and the amount so appropriated will depend upon the earnings of the past period and upon the amount of property necessary to be replaced, or renewed.

Rates of Depreciation. — The *rates* of depreciation depend upon so many factors that they have to be set arbitrarily. The fact is that the actual life of all apparatus, buildings, etc., depends so much on the location, the original quality, the kind of usage to which they are put, the amount of money expended for repairs and the promptness with which repairs are made, that the use of any one rate becomes out of the question, so that rates must be made taking into consideration all these factors, and even then of necessity they must be of an arbitrary nature.

The rates most often used are 5 and 10 per cent, or a life of 20 and 10 years, but these rates are ordinarily applied to full plants and only currently to specific objects. Take, for ex-

ample, a Babcock and Wilcox boiler. This boiler can never be wholly depreciated, for it is *repairable* or *renewable* in all its parts each in its own good time, while with a horizontal return tubular boiler, when the shell is gone the whole boiler has to be abandoned. And yet we ordinarily depreciate either boiler at the rate of 5 to 10 per cent per annum on the original cost.

It is doubtful if any one in business at present has ever seen a worn-out Corliss engine, and yet it is common to depreciate any of them at the rate of 5 per cent on the original cost. The writer has always held that when there is little chance for *obsolescence* or *supersession* a Corliss engine could be depreciated equitably at a very low rate, for the reason that by boring out the cylinder or even replacing it entire, adding new valve mechanism, babbitting the bearings and cross-head, it could be made for all practical working purposes as good as new, and all at a very limited cost, and then only at *very* long intervals.

Machine tools depreciate very slowly with ordinary use, and yet in large factories might have to be superseded due to *obsolescence* much oftener than for *decrepitude.* So rates must be set by judgment alone. On a railroad there is so much that appreciates that it often becomes doubtful if the appreciation does not in a great measure balance the depreciation. The right of way and other real estate is bound to rise in value, the solidification of the roadbed certainly does not depreciate it, and the advance in value of terminals is apt to be constant and in many places of a considerable amount. The depreciation of rails, ties and special work is, however, so great that some fund should be provided for renewing them as they wear out. This wearing out is not true depreciation, but is *wear* and *tear,* and as such should be chargeable in operating expense or a special fund, and in the case of special work which wears out quickly and irregularly, so that only comparatively small amounts come due at any set time this can be done without calling too heavily on the finances. It is quite feasible to value special work for an appraisal on the 50 per cent or cycle basis; that is, deducting the scrap value, the true value of all the special work would be one half the remaining value. But in the case of rails, unless in a very large system, the annual renewals of rails and ties will call rather heavily on capital, until such time as the yearly average renewals are of substantially the same amount, when the charge can be made direct to operating expense for *wear* and *tear,* instead of to a renewal fund. The rates of depreciation

therefore cannot be equitably adjusted until such time as the *average wear* can be calculated for the whole railroad. Rails and ties in the much traveled portions of cities seldom last for a greater period than ten years, while in the suburbs twenty or thirty years' life may be expected. One method of computing the life of a rail is to base the wear and life on the fact that 11,000,000 to 13,000,000 wheel movements over a rail will wear it down one quarter of an inch. This rate of wear has been substantiated by tests in several large cities.

In Massachusetts, the Gas and Electric Light Commission has established a rate for application to the property owned by Municipal Electric Light plants in order that a uniform charge may be used. This rate is specified as 3 per cent depreciation on the cost of all plant, exclusive of land and water power appurtenant thereto.

The Wisconsin Commissions use a method for determining the "condition per cent" that gives results based upon the sinking fund method of depreciation. The Joint Engineers Department has worked out a series of curves and tables for lengths of life as high as one hundred years.

By this method it is assumed that during the early life of the object depreciated the decrease in value will be at a rate somewhat slower than in the later period, or, that the depreciation will increase in amount at an ever increasing rate, becoming very considerable during the last part of the existence of the object.

The tables on pages 185 to 189 give the *condition per cent* for any elapsed period for any length of life up to 50 years, and the percentages are still further controlled by a statement of the actual physical condition as learned from a visual examination by the inspector who checks the list in the field. This physical condition is shown in the field notes as "G," good; "F," fair; "P," poor; and the "condition per cent" is taken from the table direct for "G"; 10 per cent is deducted from the amount shown in the table for "F"; and 20 per cent is deducted for "P."

The "condition per cent" thus found is used to state the depreciated condition of property in place of the direct age of the object, as by the straight line method which is calculated in direct proportion to the total length of life accorded the object.

For example, an engine being accorded a life of thirty years, of which fifteen years had elapsed, would be given a value due to

50 per cent of its total life by the straight line method, whereas if the "condition per cent" were applied, a considerably greater value would be given for the remaining life of the engine if, on visual examination, it was found to be in "good" condition.

The Wisconsin Railroad Commission has covered the regular plants by giving as the average life of electric railways 18.02 years, electric light plants 17.46 years, telephone plants 11.24 years.

In a paper read at the Convention of the American Institute of Electrical Engineers in Chicago, June, 1911, Henry Floy gave the following compilation of rates which have the added value that they have been accepted by some body in authority. They do not include maintenance, but cover theoretical depreciation. The list applies especially to electric railways, but many items would also be found in other industries.

Rates of depreciation charged for factories are so dependable upon use, location, rate of profit for the year and other factors that it is useless to state any that will apply to all or any factory or contents. In many industries the rate of depreciation that is drawn off depends on the profits made during the year, large amounts being written off for years of heavy net earnings and little or nothing being charged during years of light profit. In fact, it may be said that depreciation in many factories is not calculated by regular rates, but is written off in the shape of a lump sum, of any amount such as may be warranted by the year's profits.

In a lease of the North and West Chicago Street Railroad Companies to the Chicago Union Traction Company, it was provided, among other things, that there should be deducted from the gross income "a reasonable charge for depreciation of the plant and equipment" and, exception having been taken by the lessor companies to the deduction made by the lessee company under this head, and the lessee company being at the time in the hands of a receiver, Messrs. Stone and Webster of Boston were retained by the court to report what would be a reasonable deduction for depreciation.

The provision for depreciation recommended by the engineers was equivalent to 5.59 per cent of the original cost in the case of the North Chicago lines and 5.68 per cent of the original cost in the case of the West Chicago lines. The total charge in respect of maintenance and depreciation recommended by them was equivalent to 21.77 per cent and 23.70 per cent of the gross earnings of the North and West Side lines respectively.

APPROVED RATES USED IN ESTIMATING THEORETICAL DEPRECIATION

By Henry Floy, Trans. Am. Inst. E. E., June, 1911

(Maintenance not included)

Property	Depreciation per Cent per Year Straight Line	Authority	Remarks
Aërial Lines	5	St. Louis P. S. C.	Union Elec. L. & P. Co.
Air Brakes	5	Wisconsin R. R. C.	
Air Compressors	4–5	Traction Val. Comm.	Chicago Con. Tract. Co.
Arc Lamps	$6\frac{2}{3}$	Wisconsin R. R. C.	
	15	Arbitrators	Street Lighting Controversy, Atlanta, Ga., 1899.
	8	St. Louis P. S. C.	Union Elec. L. & P. Co.
Belting	5	Wisconsin R. R. C.	
Boilers	$3\frac{1}{2}$–4	Traction Val. Comm.	Chicago Con. Tract. Co.
	10	B. J. Arnold	Coney Island & Brooklyn adopted by P. S. C., N.Y.
(Water tube)	5	Henry Floy	3d Ave. Case, adopted by P. S. C., N.Y.
(Fire tube)	$3\frac{1}{3}$–$6\frac{2}{3}$	Wisconsin R. R. C.[1]	
(Water tube)	5	Wisconsin R. R. C.[1]	
(Fire tube)	10	Arbitrators	Street Lighting Controversy, Atlanta, Ga., 1899.
	$6\frac{2}{3}$	St. Louis P. S. C.	Union Elec. L. & P. Co.
Bonds	5	Traction Val. Comm.	Chicago Con. Tract. Co.
	50% wearing value	Henry Floy	3d Ave. Case, adopted by P. S. C., N.Y.
	5	Wisconsin R. R. C.	
Breeching and Connections	$3\frac{1}{2}$–10	Traction Val. Comm.	Chicago Con. Tract. Co.
Buildings (Brick)	$1\frac{1}{2}$	Traction Val. Comm.	Chicago Con. Tract. Co.
	2	E. G. Connette	3d Ave. Case, adopted by P. S. C., N.Y.
	2–4	Wisconsin R. R. C.	
(Frame)	2	Arbitrators	Street Lighting Controversy, Atlanta, Ga., 1899.
	2	St. Louis P. S. C.	Union Elec. L. & P. Co.
Cables			
Underground (high tension)	5	Henry Floy	3d Ave. Case, adopted by P. S. C., N.Y.
Underground (low tension)	50% maintenance cost	Henry Floy	3d Ave. Case, adopted by P. S. C., N.Y.
(Aërial lead covered)	$6\frac{2}{3}$	Wisconsin R. R. C.	
(Underground lead covered)	4	Wisconsin R. R. C.	
(Underground lead covered)	5	St. Louis P. S. C.	Union. Elec. L. & P. Co.
Coal and Ash Handling Machinery	7	Traction Val. Comm.	Chicago Con. Trac. Co.
	5	Henry Floy	3d Ave. Case, adopted by P. S. C., N.Y.
	10	Wisconsin R. R. C.	

[1] For electric light stations; for waterworks the Wisc. R. R. Comm. uses 5 and 4.

APPROVED RATES USED IN ESTIMATING THEORETICAL DEPRECIATION

By Henry Floy, Trans. Am. Inst. E. E., June, 1911

(Maintenance not included)

Property	Depreciation per Cent per Year — Straight Line	Authority	Remarks
Condensers	4	Traction Val. Comm.	Chicago Con. Tract. Co.
	5	B. J. Arnold	Coney Island & Brooklyn, adopted by P. S. C., N.Y.
	5	Henry Floy	3d Ave. Case, adopted by P. S. C., N.Y.
	5	Wisconsin R. R. C.	
	10	Arbitrators	Street Lighting Controversy, Atlanta, Ga., 1899.
	$6\frac{2}{3}$	St. Louis P. S. C.	Union Elec. L. & P. Co.
Conduits	1	Henry Floy	3d Ave. Case, adopted by P. S. C., N.Y.
	2	Wisconsin R. R. C.	
	2	St. Louis P. S. C.	Union Elec. L. & P. Co.
Cross Arms	$8\frac{1}{3}$–$12\frac{1}{2}$	Wisconsin R. R. C.	
Engines (Steam)	3–5	Traction Val. Comm.	Chicago Con. Traction Co.
(Steam)	5–$7\frac{1}{2}$	B. J. Arnold	Coney Island & Brooklyn, adopted by P. S. C., N.Y.
(Steam)	5	Henry Floy	3d Ave. Case, adopted by P. S. C., N.Y.
(Gas)	$6\frac{2}{3}$	Wisconsin R. R. C.	
(Steam, slow speed)	5	Wisconsin R. R. C.	
(Steam, high speed)	$6\frac{2}{3}$	Wisconsin R. R. C.	
	5	Arbitrators	Street Lighting Controversy, Atlanta, Ga., 1899.
	$6\frac{2}{3}$	St. Louis P. S. C.	Union Elec. L. & P. Co.
Feeders (W. P. Insulation)	Dependent on observed wear	Traction Val. Comm.	Chicago Con. Trac. Co.
	$6\frac{1}{4}$	Wisconsin R. R. C.	
Foundations — Machinery	Same as life of apparatus supported	Traction Val. Comm.	Chicago Con. Trac. Co.
	Same as life of apparatus supported	Henry Floy	3d Ave. Case, adopted by P. S. C., N.Y.
Fuel Oil Handling Machinery	4	Traction Val. Comm.	Chicago Con. Tract. Co.
Generators	3–8	Traction Val. Comm.	Chicago Con. Tract. Co.
	5	B. J. Arnold	Coney Island & Brooklyn, adopted by P. S. C., N.Y.
	5	Henry Floy	3d Ave. Case, adopted by P. S. C., N.Y.
(Modern type)	5	Wisconsin R. R. C.	
(Obsolete type)	$6\frac{2}{3}$	Wisconsin R. R. C.	
(Steam turbo)	5	Wisconsin R. R. C.	
	10	Arbitrators	Street Lighting Controversy, Atlanta, Ga., 1899.
	$6\frac{2}{3}$	St. Louis P. S. C.	Union Elec. L. & P. Co.

APPROVED RATES USED IN ESTIMATING THEORETICAL DEPRECIATION

By Henry Floy, Trans. Am. Inst. E. E., June, 1911

(Maintenance not included)

Property	Depreciation per Cent per Year — Straight Line	Authority	Remarks
Heaters	4–6	Traction Val. Comm.	Chicago Con. Tract. Co.
(Feed water, closed)	$3\frac{1}{3}$	Wisconsin R. R. C.	
(Feed water, open)	$3\frac{1}{3}$	Wisconsin R. R. C.	
Meters			
(Electric switchboard)	5	Wisconsin R. R. C.	
(Electric service)	$6\frac{2}{3}$	Wisconsin R. R. C.	
(Electric)	8	St. Louis P. S. C.	Union Elec. L. & P. Co.
Motors (Railway)	$3\frac{1}{3}$	Traction Val. Comm.	Chicago Con. Tract. Co.
(Railway)	By inspection	B. J. Arnold	Coney Island & Brooklyn, adopted by P. S. C., N.Y.
(Railway)	5	Henry Floy	3d Ave. Case, adopted by P. S. C., N.Y.
	5	Wisconsin R. R. C.	
(Railway)	10	Arbitrators	Street Lighting Controversy, Atlanta, Ga., 1899.
Paving	50% wearing value	B. J. Arnold	Coney Island & Brooklyn, adopted by P. S. C., N.Y.
	50%	Henry Floy	3d Ave. Case, adopted by P. S. C., N.Y.
Piping and Covering	$4–4\frac{1}{2}$	Traction Val. Comm.	Chicago Con. Tract. Co.
	6	B. J. Arnold	Coney Island & Brooklyn, adopted by P. S. C., N.Y.
	5	Henry Floy	3d Ave. Case, adopted by P. S. C., N.Y.
	5	Wisconsin R. R. C.	
	5	Arbitrators	Street Lighting Controversy, Atlanta, Ga., 1899.
	$6\frac{2}{3}$	St. Louis P. S. C.	Union Elec. L. & P. Co.
Poles (Steel)	2	Henry Floy	3d Ave. Case, adopted by P. S. C., N.Y.
(Wood in concrete)	5	Wisconsin R. R. C.	
(Wood in earth)	$5\frac{1}{2}–8\frac{1}{3}$	Wisconsin R. R. C.	
(Iron)	$2\frac{1}{2}$	Wisconsin R. R. C.	
(Wooden)	10	Arbitrators	Street Lighting Controversy, Atlanta, Ga., 1899.
Pumps	5	Traction Val. Comm.	Chicago Con. Tract. Co.
	5	B. J. Arnold	Coney Island & Brooklyn, adopted by P. S. C., N.Y.
	5	Henry Floy	3d Ave. Case, adopted by P. S. C., N.Y.
(Small steam)	$6\frac{2}{3}$	Wisconsin R. R. C.	
	5	Arbitrators	Street Lighting Controversy, Atlanta, Ga., 1899.
	$6\frac{2}{3}$	St. Louis P. S. C.	Union Elec. L. & P. Co.
Rolling Stock			
(Open car bodies)	4	Traction Val. Comm.	Chic. Con. Tract. Co.

APPROVED RATES USED IN ESTIMATING THEORETICAL DEPRECIATION

By Henry Floy, Trans. Am. Inst. E. E., June, 1911

(Maintenance not included)

Property	Depreciation Per Cent per Year — Straight Line	Authority	Remarks
(Open trailer bodies)	4	Traction Val. Comm.	Chic. Con. Tract. Co.
(Closed car bodies)	5	Traction Val. Comm.	Chic. Con. Tract. Co.
(Trucks)	$3\frac{1}{3}$	Traction Val. Comm.	Ch . Con. Tract. Co.
(Closed and open cars)	$3\frac{1}{3}$	B. J. Arnold	Coney Island & Brooklyn, adopted by P. S. C., N.Y.
(Trucks)	$3\frac{1}{3}$	B. J. Arnold	Coney Island & Brooklyn, adopted by P. S. C., N Y.
	5	Henry Floy	3d Ave. Case, adopted by P. S. C., N.Y.
(Car bodies and equipment)	$6\frac{2}{3}$	Wisconsin R. R. C.	
Stack	3	Tract. Val. Comm.	Chicago Con. Tract. Co.
(Steel)	10	B. J. Arnold	Coney Island & Brooklyn, adopted by P. S. C., N.Y.
Stokers			
(Fixed parts)	5	Tract. Val. Comm.	Chicago Con. Tract. Co.
(Moving parts)	20	Tract. Val. Comm.	Chicago Con. Tract. Co.
Storage Batteries	5	Henry Floy	3d Ave. Case, adopted by P. S. C., N. Y.
	$6\frac{2}{3}$	Wisconsin R. R. C.	
	5	St. Louis R. R. C.	Union Elec. L. & P. Co.
Switchboard and Wiring	3	Traction Val. Comm.	Chicago Con. Tract. Co.
	6	B. J. Arnold	Coney Island & Brooklyn, adopted by P. S. C., N.Y.
	5	Henry Floy	3d Ave. Case, adopted by P. S. C., N.Y.
(Modern type)	5	Wisconsin R. R. C.	
(Obsolete type)	$6\frac{2}{3}$	Wisconsin R. R. C.	
	8	St. Louis P. S. C.	Union Elec. L. & P. Co.
Telephones	10	Wisconsin R. R. C.	
Track (Rail joints)	5	Tract. Val. Comm.	Chicago Con. Tract. Co.
(Ties)	5	Tract. Val. Comm.	Chicago Con. Tract. Co.
(Rails)	Dependent on observed wear	Tract. Val. Comm.	Chicago Con. Tract. Co.
(Special work)	Dependent on observed wear	Tract. Val. Comm.	Chicago Con. Tract. Co.
(Straight and special work)	50% wearing value	B. J. Arnold	Coney Island & Brooklyn, adopted by P. S. C., N.Y.
(Straight and special work)	50% wearing value	Henry Floy	3d Ave. Case, adopted by P. S. C., N.Y.
(Special work)	$8\frac{1}{2}$	Wisconsin R. R. C.	
(Straight track)	$5\frac{1}{2}$	Wisconsin R. R. C.	
Transformers			
(Station service)	5	Wisconsin R. R. C.	
	$6\frac{2}{3}$	Wisconsin R. R. C.	
	$6\frac{2}{3}$	St. Louis P. S. C.	Union Elec. L. & P. Co.
Turbines			
(Steam)	5	Wisconsin R. R. C.	
(Water)	$3\frac{1}{3}$	Wisconsin R. R. C.	
(Steam)	$6\frac{2}{3}$	St. Louis P. S. C.	Union Elec. L. & P. Co.

Property	Depreciation Per Cent per Year Straight Line	Authority	Remarks
Wire			
Trolley	Allowance of 80.5 lbs. per 1000 ft. for wearing value of No. 0 wire	Tract. Val. Comm.	Chicago Con. Tract. Co.
Trolley	Allowance of 106.8 lbs. for No. 00	Tract. Val. Comm.	Chicago Con. Tract. Co.
Trolley	From observation	B. J. Arnold	Coney Island & Brooklyn, adopted by P. S. C., N.Y.
Trolley	No. 0, under 1 min. headway 50 %	Wisconsin R. R. C.	
Trolley	No. 00, under 1 min. headway 40 %	Wisconsin R. R. C.	
Trolley	No. 000, under 1 min. headway 33⅓ %	Wisconsin R. R. C.	
Weatherproof . . .	50% maintenance cost	Henry Floy	3d Ave. Case, adopted by P. S. C., N.Y.
Weatherproof . . .	6¼ %	Wisconsin R. R. C.	
Weatherproof . . .	7½ %	Arbitrators	Street Lighting Con., Atlanta, Ga., 1899.

In the Milwaukee Three-Cent Fare case, a number of engineers testified as to rates of depreciation, and these have been tabulated in comparison with rates specified by other engineers and companies. The table follows:

RATES OF DEPRECIATION COMPARED FOR THE MILWAUKEE CASE

	Cooley-Beegs-Starret-Pence				Chicago		Officials	Arnold
	Milwaukee Three-Cent Case				Union T. Co. Case	U. T. Co. Stone & Webster	M. E. R. & L. Co.	Chicago Appraisals 4 Cases
Buildings								
Improvements	4 & 2		2	2	2	2	3	
Track, Main	8	8.5	8		7.75	7.2	7.5	Rl. Wear Sub.-5
Special Work				12.5–7	7.75	7.2	12	10 years
Paving	10	8.5	8		10–4	10–4	10	10–25 Grt.
Cars, Bodies and Trucks	8	6.66	6	6.66–5	5	5	7.5	As Shown
Electrical Equipment .		8.5			8.5–6⅔	8.5–6⅔	6	12–25–30
Electrical Distribution .	8	8.5	7				7.5	
Poles — Iron				2.5	5	5		2.5
Poles — Wood . . .				8⅓–6⅔			7.5	
Overhead Equipment .								20 Total
Wiring, etc.					14–10	14–10		
Feeders and Cables . .				4			5	1½

RATES OF DEPRECIATION COMPARED FOR THE MILWAUKEE CASE—*Continued*

	Cooley-Beegs-Starret-Pence				Chicago		Officials	Arnold
	Milwaukee Case				Union T. Co. Case	U. T. Co. Stone & Webster	M. E. R. & L. Co.	Chicago Appraisals 4 Cases
Power Plant	8		5					2
Cranes								2
Engines				6.66–5	6.66	5	5	3–5
Boilers				8.5–6⅔	6.66	5	7.5	3½
Stacks								Steel–7 Brick–3
Stokers								25 Total
Economizers								5–10
Breechings								10–Steel
Pumps								5
Piping and Covering				5	6.66	5	7.5	3⅓
Heaters								3
Coal and Ash Machinery				20	6.66	5	10	7
Generators				5	6.66	5	7.5	5
Switchboards				2	6.66	6	5	2
Storage Batteries					6.66	5	10	
Foundations								6
Storage Bins								3–10
Shop Tools and Machinery	8		7	10–3⅓	5	2	7.5	As Shown
Furniture and Fixtures	8		5				5	As Shown
Telephone System							7.5	
Horses and Wagons	10		5					As Shown
Miscellaneous								5

The following table shows the rates used by Marwick, Mitchell & Co., a prominent firm of accountants, in the appraisal of a large street railway system.

RATES OF DEPRECIATION, EXCLUSIVE OF MAINTENANCE CHARGE

Office furniture and fixtures	5.0 per cent
Buildings	2.5 per cent
Wagons and horses	10.0 per cent
Roadway	
Rails in city streets	4.5 per cent
Rails in country roads	3.5 per cent
Rails in private right-of-way	3.5 per cent
Substructure in city streets	4.5 per cent
Substructure in country roads	7.0 per cent
Substructure in private right-of-way	10.0 per cent
Special work	9.0 per cent
Paving	
Block	2.5 per cent
Asphalt	7.0 per cent

Paving	
Brick, macadam, etc.	4.5 per cent
Tracks in car houses	3.5 per cent
Fences	
Snow	10.0 per cent
Other	5.0 per cent
Power House and Substation Equipment	
Engines Boilers Heaters Conveyors Pumps and auxiliaries	4.5 per cent
Rotaries Transformers Switchboards Auxiliaries	4.5 per cent
Storage batteries	3.0 per cent
Turbines and generators	6.0 per cent
Rolling Stock	
Cars (including all equipment)	5.0 per cent
Utility equipment	5.0 per cent
Shop Machinery	
Machine tools	5.0 per cent
Hand tools	10.0 per cent
Line	
Poles — iron	2.0 per cent
Poles — wood	7.0 per cent
Wire — trolley	5.0 per cent
Wire — guard	10.0 per cent
Spans with ears, etc.	5.0 per cent
Conduits and manholes	2.0 per cent
Feeder cables, overhead	3.0 per cent
Feeder cables leaded, in ducts	4.0 per cent
Transmission lines	2.0 per cent
Special work	8.0 per cent
Signals, telegraph, etc.	10.0 per cent
Bridges	2.5 per cent

The two tables following have been compiled by Mr. George W. Cravens and carry the comparison still farther.

DEPRECIATION

By George W. Cravens, *Electrical Review*, April 23, 1910

TABLE I

PERCENTAGE DEPRECIATION PER ANNUM

Items	Chicago Traction Commission	Chicago Union Traction Co.	Milwaukee Electric Railway & Light Co.	Wisconsin Railroad Commission	Average English	Average Scotch Practice	Philip Dawson	Stone and Webster	Industrial Power Plants	Professor G. F. Gebhardt	Miscellaneous Sources
Buildings .		2	3	2	2.5	2.5	1–2	2	1–2	2	2
Boilers . .	3.5–10	6.6	7.5	6.6–8.5	5	5	8–10	5	2.5–3.3	4–6.6	7.5
Steam Piping	3.5	6.6	7.5	5	5	5	8–10	5	2.5–3.3	5–8	5
Auxiliaries .	5–10	6.6	5	6.6–8.5	5	5	8–10	5	4–6.6	3–5	7.5
Steam Engines .	3–10	6.6	5	5–6.6	5	5	4–6	5	2.5–5	4–6.6	5
Steam Turbines . .			5		5	5	7–9	5	2.5–5	4	4
Belted Generators . .	5–10	6.6	7.5	5	5	5	5–10	5	6.6	3.3–4	7.5
Direct Connected Generators	5	6.6	7.5	5	5	5	4–8	5	4	3.3–4	5
Wires and Cables .	2	6.6	5	2	5	3	3–5	5	4–6.6	5	5
Switchboards, etc. . . .	2	6.6	5	2	7.5	5	8–10	5	2–5		5
Rotary Converters .		6.6	5	5	5	5	8–10	5	4–5	4	5
Transformers		6.6	5	5	5	5	5–6	5	3–5	4	5
Motors . .	5–10	6.6	5	5	5	5	5–8	5	4–6.6	5	5
Storage Batteries . .		6.6	10		5	5	9–11	5	5–10	6.6	10
Overhead Systems .		10–14	7.5			3	4–8	10–14	5–10		10
Cars . . .		5–8.5	6–7.5	5–6.6	10	7.5	4–6	5–8.5			7.5
Trackwork .		7.75	7.5–12	5	5	8	7–13	7.2			7.5
Shop Equipment . .	3–10	5	7.5	3.3–10	7.5	7.5	12–15	5	4–10		7.5
Supplies and Miscellaneous . .	5		5		5	7.5	1.5–2		5		5

TABLE II

Percentage Depreciation for Given Service

Items of Equipment	Light or Intermittent Service	Heavy or Continuous Service
Boilers, Water Tube	4–6.6	5–8.3
Boilers, Fire Tube	5–6.6	6.6–10
Piping, Steam and Water	4–5.5	5.5–8.3
Auxiliaries, Steam	3–5	4–6.6
Engines, Steam	4–5	5–6.6
Turbines, Steam	3–4	4–5
Generators, Belted	4–6.6	5–8.3
Generators, Direct Connected	3–5	4–6.6
Wires and Cables	3–5	4–6.6
Switchboards and Instruments	2–5	5–8.3
Rotary Converters	3–5	4–6.6
Transformers	3–5	4–6.6
Motors, A. C. and D. C.	4–6.6	5–8.3
Storage Batteries	5–6.6	6.6–10
Overhead Systems	4–10	8.3–12.5
Cars and Equipments	5–8.3	6.6–10
Trackwork, Ballast, etc.	5–8.3	7.5–12.5
Shop Equipment, Tools, etc.	5–10	7.5–15

The Chicago Telephone Commission in 1908 gave the following table of life, depreciation, and salvage.

LIFE AND DEPRECIATION OF TELEPHONE WIRES

Property	Life in Years	Per Cent to Depreciation Account	Per Cent Salvage	Per Cent to Reconstruction and Insurance
Conduit, main, clay in concrete	50	.89	0	1½
Conduit, main, fiber in concrete	20	3.72	0	1½
Conduit, subsidiary	20	3.72	0	2
Cable, main	20	3.72	—	2
Cable, subsidiary	15	5.38	40	2
Aërial cable	15	5.38	—	3
Poles, including cross arms	10	8.73	0	4½
Aërial strand	12	7.05	0	3½
Aërial cable, terminals	12	7.05	0	3
Aërial wire, copper	15	5.38	70	3
Drop wires	8	11.25	15	4
Subscribers' station instruments	10	8.73	5	2
Private branch exchange switchboards	8	11.28	20	2
Central office switchboards	8	11.25	20	2
Buildings, fireproof	40	1.33	0	1
Teams, tools, furniture, etc.	4	23.92	10	0

The following table is one compiled by "data" from various sources showing life and rates chargeable for depreciation on telephone plants.

TELEPHONE PLANT, LIFE AND DEPRECIATION OF, FROM "DATA."[1]
ANNUAL DEPRECIATION—PER CENT OF FIRST COST IN PLACE

Class of Plant	Life in Years	Junk Value % of First Cost in Place	Without Cumulative Interest	With 2 % Interest	With 3 % Interest	With 6 % Interest
Buildings:						
Fireproof	25–50	25	3.0–1.5	2.3–0.9	2.1–0.7	1.4–0.25
Mill construction	25	20	3.2	2.8	2.2	1,5
Cables:						
Aërial exchange	12–15	30	5.8–4.7	5.2–4.0	4.9–3.8	4.1–3.0
In buildings	10	30	7	6.4	6.1	5.3
Underground	—	—	—	—	—	—
Exchange, main	20–25	40	3.0–2.4	2.5–1.9	2.2–1.6	1.6–1.1
Exchange, subsidiary	13–20	40	4.6–3.0	4.1–2.5	3.8–2.2	3.2–1.6
Toll	30	40	2.0	1.5	1.3	0.76
Submarine	10	0	10.0	9.1	8.7	7.6
Cable terminals	10–12	0	10.0–8.3	9.1–7.5	8.7–7.0	7.6–5.9
Conduits, main:[2]						
Clay vitrified	50	0	2.0	1.2	0.89	0.34
Concrete	50	0	2.0	1.2	0.89	0.34
Fiber	20	0	5.0	4.1	3.7	2.7
Iron	20	0	5.0	4.1	3.7	2.7
Wood, creosoted	20	0	5.0	4.1	3.7	2.7
Conduits, subsidiary	15	0	6.7	5.8	5.4	4.3
Furniture and fixtures	10	0	10.0	9.1	8.7	7.6
Poles:						
Cedar, 35 feet and under	10–15	0	10.0–6.7	9.1–5.8	8.7–5.4	7.6–4.3
Cedar, over 35 feet	15–20	0	6.7–5.0	5.8–4.1	5.4–3.7	4.3–2.7
Chestnut, 35 feet and under	8–12	0	12.5–8.3	11.6–7.5	11.2–7.0	10.1–5.9
Chestnut, over 35 feet	12–15	0	8.3–6.7	7.5–5.8	7.0–5.4	5.9–4.3
Pine, creosoted	20	0	5.0	4.1	3.7	2.7
Poles and cross arms, average exchange	10	0	10.0	9.1	8.7	7.6
Poles and cross arms, average toll	15	0	6.7	5.8	5.4	4.3
Power plants:						
Switchboards, central office	8–10	15	10.6–8.5	9.9–7.8	9.6–7.4	8.6–6.4
Subscribers' station equipment:						
Instruments	8–10	10	11.2–9.0	10.58–.2	10.1–7.9	9.1–6.8
P. B. X. switchboards	10	10	9.0	8.2	7.9	6.8
Tools and teams	5	0	20.0	19.2	18.8	17.7
Wire exchange lines:						
Copper, bare	10–15	40	6.0–4.0	5.5–3.5	5 2–3.2	4.5–2.6
Copper insulated tw. pr.	10	10	9.0	8.2	7.8	6.8
Iron, bare	8–10	0	12.5–10.0	11.6–9.1	11.2–8.7	10.1–7.6
Wire toll lines:						
Copper, bare	40	40	1.5	1.0	0.8	0.39
Iron, bare	15	0	6.7	5.8	5.4	4.3

[1] Adapted from practice of A. T. & T. Co., Wisconsin R. R. Commission and others.

[2] Includes manholes.

U. S. GOVERNMENT ALLOWANCE FOR DEPRECIATION

Buildings	Per Cent per Annum
Brick, occupied by owner	1 to $1\frac{1}{4}$
Brick, occupied by tenant	$1\frac{1}{4}$ to $1\frac{1}{2}$
Frame, occupied by owner	2 to $2\frac{1}{2}$
Frame, occupied by tenant	$2\frac{1}{2}$ to 3

LIFE OF ITEMS OF PHYSICAL PLANT

Following is a good average estimate of the life of the different items going to make up the physical plant of the following named properties:

Waterworks.
Power plants.
Buildings.
Electric light and railways.
Telephones.
Gas plants.

Some of the items have been copied directly from a "Memorandum regarding values used for lives of structures and equipment," gotten out by the Joint Engineering Department of the Wisconsin Commissions.

Waterworks	Years' Life
Wells, driven or drilled	50 to 75
Wells, large open, stone or brick walled	75 to 100
Suction piping and intakes	30 to 50
Stand pipes	30 to 50
Reservoirs	50 to 100
Filter beds	30 to 50
Distribution System, for Waterworks	
Cast-iron mains, including fittings and valves	75 to 100
Wrought-iron mains and services, galvanized and including valves and fittings	30 to 50
Cast-iron mains and services, black	25 to 35
Services to buildings, lead	50 to 100
Power Plant Equipment	
Gas engines	10 to 15
Corliss slow speed engines	25 to 30
High speed engines	15 to 20
Waterworks, pumping engines, duplex	20 to 25
triplex	20 to 30
flywheel	30 to 40

Boiler feed pumps	15 to 20
Geared power pumps	20 to 30
Centrifugal pumps	20 to 30
Boilers, fire tube	10 to 15
Boilers, water tube	20 to 30
Heaters	20 to 30
Condensers	20 to 30
Coal and ash conveyers	10
Turbine waterwheels, built before 1900	25 to 40
Turbine waterwheels, built after 1900	30 to 50
Jack shaft	20 to 40
Piping	20 to 30
Pipe covering	same as pipe
Leather belting	20 to 25
Generators, motors and rotaries	
modern	20
obsolete	15
Static transformers, including regulators and compensators, station type	20
Turbo generators	20
Switchboard and wiring complete	
modern type	20 to 30
obsolete type	15 to 20
Switchboard and instruments	
modern type	20 to 30
obsolete type	15 to 20
Storage batteries	10 to 15
Lightning arresters, station type	15 to 20

Foundations for machinery give same life as the machine they support.

Buildings (Wisconsin Commissions)

First class stone and brick (office buildings)	75
Second class shops, car barns and power stations	50
Brick gas retort houses	30
Frame dwellings	35
Frame stables and coal sheds	20 to 25

Electric Light and Railways

Copper wire, weatherproof insulation	10 to 15
Cable, lead covered, aërial	10 to 15
Cable, lead covered, underground, in conduits	20 to 25
Conduit	30 to 50
Manholes	30 to 50
Poles, cedar, in earth	10 to 18
Poles, cedar, in concrete	12 to 20

Poles, iron in concrete	15 to 30
Pole anchors and guys	10 to 20
Cross arms	10 to 15
Service transformers	10 to 15
Fuse boxes	10 to 12
Lightning arresters	10 to 12
Arc lamps and span equipment	10 to 15
Nernst lamps	8 to 10
Service wattmeters	10 to 15
Railway spans and bracket equipment	15 to 20

Trolley wire; life depends on headway; should never be worn to less than 75 per cent of its original size.

#0 wire at 1 minute headway, life 2 years.

#00 wire at 1 minute headway, life $2\frac{1}{2}$ years.

#000 wire at 1 minute headway, life 3 years.

Telephone Equipment (Wisconsin Commissions)

Central office equipment including distributing frame	10
Power, plant and wire	8
Poles	12 to 15
Cross arms	8 to 12
Iron wire	8 to 15
Copper wire	20
Weatherproof iron wire	15
Cables, lead covered, aërial	12
Cables, lead covered underground	20
Subscribers' sets	10
Furniture and tools	7

Gas Plants (Wisconsin Commissions)

Benches	25
Scrubbers and condensers	30
P. and A. tar extractors	40
Cast-iron washers	40
Exhausters	25
Purifiers, modern	50
Purifiers, old type, according to size and condition	—
Cast-iron gas connections, within the plant	50
Station meter cases	50
Station meter drums	20
Ammonia concentrators	15
Ammonia storage tanks, wrought iron or steel	15
Tar and ammonia wells	50
Water gas machines complete	30
Centrifugal blowers	15

Holders	50
Governors	50
Cast-iron mains. 3″ and 4″	50
Cast-iron mains. 6″ and larger	75
Wrought-iron and steel mains under 3″	20
Wrought-iron and steel mains over 3″	30
Services	20
Consumers' meters	25
Consumers' governors	25
Retort house floors, depending on construction	15 to 30

Foundations for machinery, same life as machine they support.

Waterworks Property, Limits of Useful Life

By Leonard Metcalfe, p. 24, Vol. LXIV, Trans. Am. Soc. C.E., 1909

	Useful Life
Reservoirs [1]	50 to 100 years
Standpipes	25 to 40 years
Masonry buildings	40 to 50 years
Wooden buildings	20 to 50 years
Cast-iron pipe of large diameter	50 to 75 years
Cast-iron pipe of small diameter	20 to 40 years
Steel pipe	25 to 50 years
Wood stave pipe	20 to 30 years
Wrought-iron service pipe	15 to 30 years
Meters	20 to 30 years
Hydrants	40 to 50 years
Gates	40 to 50 years
Pumping and auxiliary machinery	20 to 30 years
Steam engines	15 to 25 years
Boilers	12 to 16 years
Electrical machinery	20 to 30 years

Renewals in Chicago Traction System

An official definition of renewals to street railways has been issued by the Board of Supervising Engineers of the Chicago Traction System, in the form of a book which specifically states what expenditures are renewals, and what should be charged to maintenance. Each railway company is required to deposit in some trust company or other fiduciary institution 8 per cent

[1] Except where subject to heavy deposit of silt.

of its gross receipts to cover renewals to the system, and no payments are ever to be made from this fund without the written sanction of the Board of Supervising Engineers who are to determine if the expenditure is properly chargeable to renewals. The deposit of this fund creates confidence in the public mind that the renewals and replacements will be kept up and that improvements will be made as required. It is early yet to say whether this 8 per cent will be large enough to cover all renewals as time goes on, but the board has power to increase the rate at such time as it may be proved to be too small.

Renewals[1]

"The traction ordinances of February 11, 1907, refer to the subject of Renewals in the following manner:

"Section 7. The cost of renewals shall be paid as provided in Section 16 hereof, but such expenditures (and only such expenditures) as are made for the purpose of extensions or additions to property shall be thereafter considered as additions to capital; provided, however, that in the replacement of any principal part of the property, either existing or hereafter acquired, there shall be charged to capital the excess amount that the new property cost over the original cost of the property displaced.

"Section 16. The company shall deposit with one or more of the said depositaries in a separate fund, appropriately designated, a sum equal to eight (8) per cent of the gross receipts of said street railways and property for the preceding month, which shall constitute a reserve fund for taking care of renewals and depreciation of said street railways and property. . . . No payments shall be made by said company out of said fund, except on the written certificate of the Board of Supervising Engineers, for renewals, which are hereby defined to be the replacement of any principal part of said street railways or of their equipment or appurtenances."

The two main points to be construed by the Board under the foregoing provisions of the ordinance are:

(*a*) Original cost.

(*b*) Principal part.

These points and other collateral issues, particularly the distinction between Renewals and that of Maintenance and Repairs, were discussed at various times by the Board throughout the year 1910, which discussions have led to the following conclusions:

[1] As defined by Board of Supervising Engineers, Chicago Traction System.

General Rulings

1. The "original cost" of any property renewed shall be the cost of the property displaced.

2. *Property which has not been Rehabilitated.* The T. V. C. value shall be taken as the "original cost."

3. *Property that has been Rehabilitated.* The rehabilitated cost, but not the rehabilitated cost plus the T. V. C. value, shall be taken as the "original cost."

4. *Property Semi-rehabilitated.* The T. V. C. value, plus the cost of semi-rehabilitation, less the T. V. C. value of the part replaced in the process of semi-rehabilitation, shall be taken as the "original cost."

5. *Paving which has not been rehabilitated.* 25.29 per cent of the T. V. C. value shall be taken as the "original cost," that being the estimated amount included in the allowed valuation of $50,000,000.00 for the Chicago City Railway and Chicago Railways Companies' property. 5.08 per cent of the T. V. C. value shall be taken as the "original cost" for Calumet & South Chicago Railway Company. T. V. C. values shall be allowed as shown in the T. V. C. reports for the Southern Street Railway and Consolidated Traction properties.

6. The first paragraph of Section 15 of the ordinances shall be construed as referring to repairs only.

7. The minimum charge to Capital or Renewals shall be $200.00, this rule being adopted for the purpose of simplifying accounting.

8. In case of renewal in kind there shall be no addition to Capital Account, except in special cases, which shall be considered and ruled upon by the Board at the time application for work order is submitted by the companies. By renewal in kind is meant the replacement of existing property by new property of similar general character and construction.

9. Salvage in all cases shall be credited to the Renewal Fund.

10. Special cases may arise in connection with all classes of reconstruction work to which these rules cannot be specifically applied. In such cases, the Board shall give special consideration as to the proper classification of the cost of such work at the time application for work order is submitted by the companies.

Note. The initials "T. V. C." refer to the respective Traction Valuation Commission reports placing values on the several railway properties, as follows:

Chicago City Railway Company	$21,000,000.00
Chicago Railways Company	29,000,000.00
Calumet and South Chicago Railway Company	5,000,000.00
Southern Street Railway Company	775,000.00
Chicago Consolidated Traction Company	3,930,684.51

Division "D"

Track

1. The principal parts of track construction are as follows:
   (*a*) Rails and fastenings.
   (*b*) Ties.
   (*c*) Foundations.
   (*d*) Special work.
   (*e*) Paving.

2. Old track rehabilitated with new standard track construction, the cost of new work shall be divided between Renewals and Capital, as prescribed in the ordinances.

3. Replacement of one fourth mile continuous distance of single track, or a stretch of track between two special work layouts shall be considered as a unit representing a principal part for straight or curved track outside of special work.

4. In case of a renewal of rails and fastenings (standard construction), all other track work occasioned thereby shall be considered as a part of the charge to Renewals, but there shall be no charge to Capital unless the total cost of the renewal work shall exceed the total cost of an equal length of standard track construction complete, and then only after special consideration.

5. Replacement of one fourth mile continuous distance of paving 8 feet wide, of the full width of the pavement in the right of way between any two special work layouts, shall be considered as a unit representing a principal part for the renewal of paving.

6. *Special Work.* A straight standard single-track crossing, either electric or steam railroad, or its equivalent, shall be considered a principal part for special work renewals, except in the replacement of layouts containing curves, in which cases a decision as to the proper charge to Renewals shall be made at the time request for work order is submitted to the Board.

7. In order to simplify accounting and economize work, the following computations shall be made to determine the cost of rehabilitated track work and special work for Renewal purposes and to establish a proper basis for charge to Renewal Account:

(*a*) The T. V. C. value of track and paving to be set aside and considered separately.

(*b*) An estimate to be made fixing a unit cost on new special work for each type, this estimate to be applied to the various individual layouts of new special work of each of the railway companies. This estimate to include a percentage for overhead. The aggregate cost thus determined of all pieces of special work in track to be deducted from the total track account, as shown on the books of the Board after setting aside T. V. C. values as above.

(*c*) The remainder to be considered as the aggregate cost of straight or curved tracks rehabilitated to date, not included in special work.

(*d*) A computation should then be made estimating the cost of each of the different types of rehabilitated straight track construction (including curved track not in special work), and the cost of each type so determined shall be multiplied by the number of miles of each type of track, respectively.

(*e*) The aggregate so found will then be compared with the total charges against track account, excluding special work and T. V. C. values as above, but including paving outside of right-of-way, track elevation expense and all other expenses incidental to track construction, including overhead expense.

(*f*) The difference between the aggregate of the estimates and the amount shown on the books of the Board (excluding special work and certain T. V. C. values as above) is to be distributed pro rata over the various miles of track of different track construction, and the unit costs thus determined will represent the cost per mile of track for each type, for the purpose of establishing a basis for charges to Renewal Account.

(*g*) Estimates for paving inside right-of-way to be calculated upon the same general plan and carried separately, so that a unit cost for the different types of paving may be available in cases where the paving is renewed without any renewal of track being made.

(*h*) The totals of T. V. C. values as above, rehabilitated special work and track values and paving values should equal the total track and paving accounts on the books of the Board.

These computations shall be made separately for each company.

Division "E"

Electrical Transmission and Distribution

1. The principal parts of the electrical transmission and distribution system are as follows:

(*a*) Poles and fittings.
(*b*) Trolley (wire).
(*c*) Span wire and fittings.
(*d*) Special work overhead.
(*e*) Overhead feeder.
(*f*) Underground feeder.
(*g*) Cross bonds and negative auxiliary return cable.
(*h*) Conduits, manholes and vaults.
(*i*) Submarine cables.
(*j*) Joint bonds and auxiliary cable at special work.
(*k*) Dispatching system.

2. The replacement of one quarter mile continuous distance of pole line, either side pole or center pole construction, shall be considered as a

unit representing a principal part for a pole line, including all other necessary work occasioned thereby.

The ordinary replacement of cross arms and pole fittings from time to time shall be charged to Maintenance.

3. The replacement of trolley wire on one mile continuous distance of single track or one half mile of double track shall be considered as a unit representing a principal part for the renewal of trolley wire; anything less to be charged to Maintenance.

4. The replacement of span wires on one mile continuous distance of single track, or one half mile of double track, shall be considered as a unit representing a principal part for the renewal of span wire, including all other necessary work occasioned thereby.

5. *Special Work Overhead.* Replacement of a complete layout of special work overhead, in case the cost is $200.00 or more, shall be considered as a unit representing a principal part for the renewal of special-work overhead (which includes trough work and bridge work), and all necessary work occasioned thereby.

6. The replacement of one mile continuous distance of overhead feeder shall be considered as a unit representing a principal part for the renewal of overhead feeder, including all other necessary work occasioned thereby.

Where overhead feeder is taken down and placed in stock and subsequently used on outlying lines, the job from which it is claimed shall be credited at the scrap value of the material taken down, and the work on which it is subsequently used shall be charged at the same value.

7. The replacement of one quarter mile continuous distance of underground feeder shall be considered as a unit representing a principal part for the renewal of underground feeder, including all other necessary work occasioned thereby.

Substitution of underground for overhead feeder not to come under the rule relating to renewals in kind; the excess cost of the work of such substitution and all other necessary work occasioned thereby, over the original cost of the work replaced, shall be considered a proper charge to Capital Account.

8. Replacement of one quarter mile, or the distance between two track special work layouts for auxiliary negative return cable and cross bonds shall be considered as a unit representing a principal part for the renewal of auxiliary negative return cable and cross bonds including all other necessary work occasioned thereby.

9. The replacement of special work bonding or auxiliary cable will follow the ruling of the Board in each specific case in accordance with paragraph 6 for track work.

10. The renewal of a conduit line is considered a very remote possibility, and such replacements as are occasioned by conduits breaking or excavations at street intersections or at intervals under tracks,

made by the city or other public utilities, shall be charged to Maintenance. In case for some reason it should be necessary to close up a manhole and vault and build another one at a different location, the cost shall be charged to Maintenance.

11. The replacement of the length of submarine cable between the manholes on each land side shall be considered as a unit representing a principal part for the renewal of submarine cable, including all other necessary work occasioned thereby.

12. A telephone or signal system outside of buildings and used for dispatching or operating cars shall be considered a principal part for renewal. The replacement of the system as a whole would be a proper charge to Renewals, but the replacement of individual parts, such as instruments, signal or connecting wires and general repairs shall be charged to Maintenance.

13. The same general plan shall be observed in valuing Electrical Transmission and Distribution property for the purpose of determining the proper basis for charge to Renewal Account as is prescribed in connection with the valuation of track for the same purpose.

Division "K"

Cars

1. The principal parts of cars are as follows:
   (*a*) Body and its component parts.
   (*b*) Electrical equipment and its component parts.
   (*c*) Air-brake equipment and its component parts.
   (*d*) Trucks and their component parts.
   (*e*) Miscellaneous equipment.

2. In case any one of these principal parts becomes obsolete or worn out in service and is replaced, rebuilt or reproduced, the cost of such replacement, rebuilding or reproduction shall be charged to Renewals.

3. *Car Bodies.* In case a car body is replaced in kind, and a portion of the equipment replaced by new equipment and another portion of the equipment overhauled and used again, the entire cost of the work shall be charged to Renewals.

4. *Electrical Equipment.* Same as car bodies. The winding of an armature or the replacement of any part of the electrical equipment in individual cases shall be charged to Maintenance, but, for example, in cases where the controllers on a group of cars are replaced by improved controllers, for reasons of economy or otherwise, the cost would be a proper charge to Renewals.

5. *Air-brake Equipment.* Same as car bodies.

6. *Trucks.* Same as car bodies. Replacement of wheels shall be charged to Maintenance.

7. Miscellaneous equipment, such as headlights, fenders, guards, etc., ordinary replacement in individual cases shall be charged to Maintenance. In cases, however, where, for example, new headlights are placed upon a group of cars, or upon the cars equipping an entire line or division, or the cars running out of a particular car house, the expense shall be charged to Renewals. In case seats are replaced on a single car, the expense shall be charged to Maintenance; but if such changes are made on a group of cars or on cars equipping an entire line or running out of a particular car house, the expense shall be charged to Renewals.

8. Ordinary repairs, or general overhauling, or repainting, shall be charged to Maintenance.

9. Where a car is demolished or damaged in whole or in part by a collision or other accident, the cost of repairing the damage or replacing the car shall be charged to Maintenance, excepting that when a car is destroyed by fire, the provisions of the ordinances governing insurance shall be applied.

10. The same general plan shall be observed in valuing cars for the purpose of determining the proper basis for charge to Renewal Account as is prescribed in connection with the valuation of track for the same purpose.

Division "G"

Buildings

1. The principal parts of buildings are as follows:
   (*a*) Foundations.
   (*b*) Walls.
   (*c*) Coping.
   (*d*) Roof.
   (*e*) Cut stone or terra cotta trim.
   (*f*) Mill work — sash, doors and windows, wainscoting, etc.
   (*g*) Carpentry.
   (*h*) Glazing.
   (*i*) Iron shutters.
   (*j*) Steel rolling doors.
   (*k*) Floors — wood, concrete, tile, composition, brick.
   (*l*) Plumbing, sewerage and water supply.
   (*m*) Structural steel and iron.
   (*n*) Sheet metal work — skylights, flashing and down spouting.
   (*o*) Heating plant and accessories.
   (*p*) Lighting system.
   (*q*) Telephone system — interior.
   (*r*) Chimneys or stacks.
   (*s*) Miscellaneous equipment —

(1) Lockers.
(2) Racks.
(3) Bins.
(4) Tables.
(5) Benches, etc.

(*t*) Painting and decorating.
(*u*) Sidewalks, driveways and fences.

2. The buildings now being used by the companies are of such a character of construction that, with adequate and timely repairs, ordinary wear and tear would not necessitate the complete renewal of any one portion of a building, with such exceptions as are hereinafter noted, until time had brought about a complete disintegration of the entire structure. There may be occasions when, for reasons of expansion, for the purpose of concentrating facilities or for some other extraordinary purpose, it would be necessary to destroy and replace a building, either in whole or in part, with a larger building, or with a different character of building, in which event the rules of renewals would apply as laid down in the ordinances.

In the case of buildings destroyed by fire and subsequently rebuilt, the question of accounting is covered by the sections of the ordinances governing insurance.

3. The foundations are as near as may be possible impervious to ordinary wear and tear, and should not require replacement under ordinary conditions during the life of the building.

4. The pointing of walls, cementing of cracks in coping, patching of floors, replacement of broken lights and skylights, new flashing, new down-spouts, painting, plastering, calcimining and decorating are all in the nature of Repairs and Maintenance and should be so charged.

In cases where walls and smoke stacks crack, or chimneys are blown down or destroyed, the repairs shall be charged to Maintenance.

5. Defects and individual replacements in lighting systems, plumbing, sewerage and water supply system are taken care of as they develop, and unless some improvement calls for an entire change in the method of the lighting, sewerage, plumbing or water supply, there would be no occasion for a charge to Renewals.

6. Miscellaneous equipment, as enumerated above, is seldom replaced in whole, and, as a rule, with ordinary repairs, should last throughout the life of the building. In a case, however, where a set of wooden racks, lockers or bins is replaced with metal construction, it would be proper to apply the rule for Renewals as prescribed in the ordinances.

Exceptions

7. *Fire Walls.* In case of a complete renewal of any one or more fire walls in or about the buildings, the expense would be a proper charge to Renewals.

8. *Roofs, Old Style, Wood Foundation, Felt, Tar and Gravel Covering.* In case of an entire replacement of the felt, tar and gravel covering, or of the entire roof, either in kind or with a roof of different construction, the cost would be a proper charge to Renewals, except in case the new roof was of a better type and cost more than the old roof; then a proper division of the charge should be made as between Renewals and Capital.

9. *Concrete Roofs not covered.* It is probable that these roofs will remain in good condition for as long a time as the first tar and gravel roof covering would last, the same as though they were covered. When they become cracked or leaky, a covering should be placed on the concrete, which covering would be a proper charge to Capital Account.

10. *Book Tile and Concrete Slab Roofs, with Tar Felt Covering. Tile or Slate Roof.* The replacement of either roofs or roof coverings (weather proofing), complete, is a proper charge to Renewals.

11. The recoating of a tar and gravel roof is a proper charge to Maintenance.

Division "I"

Power Plant Machinery and Equipment

1. The principal parts of power plant machinery and equipment are as follows:

(*a*) Machinery foundations.
(*b*) Engines.
(*c*) Generators.
(*d*) Economizers.
(*e*) Traveling cranes.
(*f*) Switchboard.
(*g*) Wiring.
(*h*) Piping and covering.
(*i*) Condensing equipment
(*j*) Heaters and purifiers.
(*k*) Boilers.
(*l*) Pumps.
(*m*) Grates and stokers.
(*n*) Coal and ash handling apparatus.
(*o*) Coal and ash storage bunkers.
(*p*) Breeching.
(*q*) Miscellaneous equipment.

Substation Machinery and Equipment

2. The principal parts of substation machinery and equipment are as follows:

(*a*) Machinery foundations.
(*b*) Rotary converters.

(*c*) Transformers.
(*d*) Reactances.
(*e*) Oil switches.
(*f*) High tension bus and structure.
(*g*) Switchboard.
(*h*) Traveling cranes.
(*i*) Wiring, A. C. and D. C.
(*j*) Air-blast apparatus.
(*k*) Storage battery.

Shop Machinery and Tools

3. The principal parts of shop machinery and tools are as follows:
(*a*) All classes of shop tools and machinery.

4. The replacement of any one of the foregoing items in paragraphs 1 2 and 3, complete, would constitute a proper charge to Renewal Account, or, in case the replacement was an improvement over the item replaced, the excess cost, if any, would be a proper charge to Capital.

In instances where a machine has received constant repairs over a period of time, the cost of such repairs being charged to Maintenance, and eventually some portion of the machine required complete renewal, the cost of which might represent a large sum of money, such an expense would not be in the nature of ordinary repairs or maintenance, but should be considered as extraordinary maintenance and upon consideration by the Board could be construed by it as properly chargeable to Renewal Account; as illustrations — the replacement, complete, of tubes in a water tube boiler; the reconstruction, complete, of brick settings under a battery of boilers; the complete rearrangement of the piping system; the rewinding of a generator; the replacement of plates or cells in a storage battery.

5. *Machine and Tool Equipment.* The first installation of machine and tool equipment, such as cutting tools, dies and jigs or other appurtenances and attachments, should be charged in the same manner as the tool or machine itself, either to Renewals or to Capital, but subsequent replacements of such appurtenances or attachments are properly chargeable to Repairs.

Replacement of hand tools is properly chargeable to Maintenance.

6. *Furniture and Fixtures: Office; Power Plant; Substation; Shops; Car Stations.* Any additional items over and above existing furniture or equipment will be a proper charge to Capital in case the cost is $200.00 or more. Any replacements of existing furniture or equipment would be a proper charge to Renewals in case the cost was $200.00 or more. All replacements or new purchases costing less than $200.00 would be properly chargeable to Maintenance.

Division "P"

Tunnels

1. *Tunnels and Subways under Viaducts.* The tunnels under the Chicago River have been built with the idea that, with proper maintenance under normal conditions, they would last for an indefinite period of time. If, by reason of accident or because of some unforeseen structural weakness, it should become necessary to rebuild the tunnel in whole or in part, the disposition of the cost would be the subject of special consideration.

2. The renewal of tracks and electrical transmission system in the tunnels is covered by general rules relating thereto.

3. The replacement of the lighting system, complete, would be a proper charge to Renewals, but the replacement of lamps, globes, individual parts and general repairs shall be charged to Maintenance.

4. The replacement of a drainage system, complete, shall be charged to Renewals.

5. The replacement of a pump shall be charged to Renewals.

6. The replacement of a wooden subway under a viaduct by a cement subway shall be charged to Renewals, and the excess cost over the cost of the wooden subway, if there be an excess, shall be charged to Capital.

Bridges and Viaducts

As the companies at the present time do not own and have no equity in the bridges and viaducts traversed by their tracks, the question of renewals is confined to the tracks and transmission system. These are covered by the general rules relating to each.

CHAPTER IX

AMORTIZATION

Amortization may be described as the depreciation of capital, or, according to Webster, "The extinction of a debt, usually by means of a sinking fund."

When a sinking fund is provided for the taking up of bonds at maturity, such bonds may be said to be *amortized.*

A property which is operating under a franchise which has no chance of renewal should amortize any and all investment thereunder, and rates must be charged for the output which will not only show a profit upon the investment, but will return the investment itself at the expiration of the franchise.

When a public utility property is being operated under perpetual franchise, of course it is unnecessary to amortize the investment on this account, but all development expenses should be amortized at a rate which, while extinguishing them before the expiration of the life of the bonds, will not seriously interfere with the returns on the property. When bonds have been issued for development expenses, the rate of amortization will naturally be one which will cancel the bonds at their maturity. Where development has been carried on by cash capital or from earnings, a rate of amortization which will cancel the cost at any convenient time that may be set for the future will do. Development expenses are best amortized by using the surplus earnings over and above a fair rate of income on all the capital (cash) invested, and are fully described in the chapter on values, page 6.

When factories are built upon leased ground, they are usually subject to a renewal of the lease for a specified term, or are turned over to the owner of the land at the expiration of the lease. In such a case it is, of course, necessary to charge a rate of depreciation that will return the entire cost of the building in order to recoup the owners for the capital invested.

"If a sinking fund be added, the item of interest upon invested capital included above would be omitted, of course, after the amortization

of the debt of construction by the sinking fund. If the annual contribution to the sinking fund be large, the construction debt will be quickly paid, but the present burden will be heavy upon the consumer; if it is small, the period will be lengthened and the burden decreased. Views differ upon this question, which is, after all, one of sound public policy. The occasional needs or burdens growing out of war, fire, earthquake, flood, or other disaster, which have befallen cities from time to time, dictate, or at least indicate, the wisdom of letting each generation bear its own burdens and of making regular contribution to a sinking fund, which will wipe out the construction debt within a reasonable period of time, such as twenty or forty years." (Metcalfe, Waterworks Valuation, etc., Am. Soc. C.E., Vol. LXIV, 1909, p. 35.)

Amortizing the Investment. — In making contracts for franchises between municipalities and public utility corporations, one method that suggests itself is, for the municipality to so word the franchise that after, say, five years, the company will be obliged to charge itself a certain percentage on its investment — not necessarily capital — in order to retire this investment, less the junk or salvage value of the plant, at the end of the franchise term.

As any such charge would necessarily have to come from earnings, it would become a charge against income, and, as a fixed rate of income is now being advocated by many municipalities for the public utilities, and in many cases being fixed by the courts, it would be a point for discussion whether a short term franchise requiring a large charge for amortization be given, or a comparatively long term be designated, bearing a relatively much lower charge. It must be borne in mind that when the short term franchise is given, the charge will always remain high for every time it is repeated.

For instance, compare two franchises, one for twenty-five years and another for fifty years. Assume an investment (actual) of $1,000,000 when the corporation starts business, and that for improvements and additions this investment is increased from time to time; say, at the end of ten years $100,000 has been added, and at the end of fifteen years another addition of $200,000 be made, and at the end of twenty years the investment has been increased by $50,000 more, or making a total investment at the end of twenty years of $1,350,000, which must, of course, be fully amortized, owing to the fact that the franchise expires and there is no assurance that it will be renewed.

First or Twenty-five-year Franchise, No Amortization for First Five Years

$1,000,000 to end of term, 20 years @ $2\frac{1}{2}$ per cent = $39,100 per annum.
$100,000 to end of term, 15 years @ $2\frac{1}{2}$ per cent = $5,580 per annum.
$200,000 to end of term, 10 years @ $2\frac{1}{2}$ per cent = $17,860 per annum.
$50,000 to end of term, 5 years @ $2\frac{1}{2}$ per cent = $9,510 per annum.

Then, from 20 years' remaining life to 15 years' remaining life the franchise charge for amortization will be . . . . $39,000 per annum.
From 15 to 10 years' life the charge will be . . . $44,680 per annum.
From 10 to 5 years' life the charge will be . . . $62,540 per annum.
From 5 years' life to the end of the term will be . $72,050 per annum.

Second or Fifty-year Franchise, No Amortization for First Five Years

$1,000,000 to end of term, 45 years @ $2\frac{1}{2}$ per cent = $12,300.
$100,000 to end of term, 40 years @ $2\frac{1}{2}$ per cent = $11,480.
$200,000 to end of term, 35 years @ $2\frac{1}{2}$ per cent = $3,640.
$50,000 to end of term, 30 years @ $2\frac{1}{2}$ per cent = $1,140.

Then, from 45 years' remaining life to 40 years' remaining life the franchise charge for amortization will be . . . . $12,300 per annum.
From 40 to 35 years' life the charge will be . . . $13,780 per annum.
From 35 to 30 years' life the charge will be . . . $17,420 per annum.
From 30 years' life to the end of the term will be . $18,560 per annum.

The following tabulation will show the comparison of the two terms of franchise:

Total Investment	25-Year Franchise	50-Year Franchise
	Per Annum	*Per Annum*
$1,000,000 . .	20 to 15 years' life $39,000	45 to 40 years' life $12,300
$1,100,000 . .	15 to 10 years' life $44,680	40 to 35 years' life $13,780
$1,300,000 . .	10 to 5 years' life $62,540	35 to 30 years' life $17,420
$1,350,000 . .	5 years' life to end $72,050	30 to end of life $18,560

The small addition to the investment, $50,000 at the end of twenty years, is advisedly so for the reason that no company would care to increase the investment to a greater extent than necessary during the last five years of the life of the franchise, owing to the approaching end of the business. Still, in case the amortization fund were actually permitted by the municipality, — which, under the conditions named, would be necessary, — the investment would not suffer, no matter how near to the end of the term the addition might be made.

Comparing two shorter term franchises we have for:

Twenty-year Franchise, No Amortization for First Five Years

$1,000,000 to end of term, 15 years @ 2½ per cent = $55,800 per annum.
$100,000 to end of term, 10 years @ 2½ per cent = $ 8,930 per annum.
$200,000 to end of term, 5 years @ 2½ per cent = $38,040 per annum.

Forty-year Franchise, No Amortization for First Five Years

$1,000,000 to end of term, 35 years @ 2½ per cent = $18,200 per annum.
$100,000 to end of term, 30 years @ 2½ per cent = $2,280 per annum.
$200,000 to end of term, 25 years @ 2½ per cent = $5,860 per annum.
$50,000 to end of term, 20 years @ 2½ per cent = $1,955 per annum.

Comparison of Twenty-year and Forty-year Franchise

Total Investment	20-Year Franchise		40-Year Franchise	
		Per Annum		Per Annum
$1,000,000 . .	15 to 10 years' life	$55,800	35 to 30 years' life	$18,200
$1,100,000 . .	10 to 5 years' life	$64,730	30 to 25 years' life	$20,480
$1,300,000 . .	5 years' life to end	$102,770	25 to 20 years' life	$26,340
$1,350,000 . .			20 years' life to end	$28,295

One may ask if a depreciation fund established to renew the plant does not act as an amortization fund; it does as far as actual physical plant is concerned, and if a thoroughgoing fund for depreciation should be established, the values upon which it is calculated can be deducted from the total investment before computing the amount chargeable to amortization of the capital. Especially is this the case where franchises, or any other intangible property, are admitted as having a material value, as when stock has been issued for a franchise and its value ends with that of the franchise.

There is another way to regard this situation, and that is, instead of charging to an amortization fund the amounts due it yearly, the same amount could be, and usually is, paid to the stockholders or investors annually in dividends, thus returning the capital to the investor in small amounts, and at the wind-up of the company at the expiration of the franchise, sell the property remaining at such figure as it may bring, and return this amount to the investors as a final dividend. In some states franchises are so worded that the municipality has the right to purchase the property of a public utility at the expiration of the franchise. It must

be said, though, that in the past twenty years public utility companies have passed through so many changes, including mergers, consolidations, reorganizations, etc., that franchises have had to be adjusted to meet the conditions, and in few cases have capitalists been called upon to close out a business without a return of this capital.

The Public Service Commission of New York has this to say on amortization accounts:

> "*Accrued Amortization of Capital.* Credit to this account, such amounts as are charged from time to time to 'Operating Expenses,' or other accounts to cover depreciation of plant and equipment, and other amortization of capital. When such capital is retired from service, the original money cost thereof (estimated, if not known, and where estimated, that fact, and the facts upon which the estimates are based, shall be stated in the entry), less salvage, shall, except as provided in Account G–100, 'Fixed Capital, December 31, 1908,' be charged to this account. The amount originally entered or contained in the charges to any capital account in respect of such capital so going out of service shall be credited to such capital account and any necessary adjusting entry made to the appropriate sub-account under the account 'Corporate Surplus or Deficit.'"
>
> "*General Amortization* — Gas. Charge to this account month by month the amount estimated to be necessary to cover such wear and tear and obsolescence and inadequacy as have accrued during the month in the tangible gas capital of the corporation, such portion of the life of intangible fixed capital as has expired or been consumed during the month, and the amount estimated to be necessary to provide a reserve to cover the cost of property destroyed by extraordinary casuality, less the amount charged for that month to the various repair accounts in gas operating expenses. The amount charged (or credited) to this account shall be concurrently credited (or charged) to the reserve account No. 374, 'Accrued Amortization of Capital.'"
>
> "*Note A.* Until otherwise ordered, the 'amount estimated to be necessary to cover such wear and tear and obsolescence and inadequacy as have accrued during any month shall be based on a rule determined by the accounting corporation. Such rule may be derived from a consideration of the said corporation's history and experience during the preceding five years, and the accrual may be on the basis of amount of gas sold. Amortization of intangible capital shall likewise be based on rule. Whatever may be its basis, such rules and a sworn statement of the facts and expert opinion, and estimates upon which they are based shall be filed with the Public Service Commission on or before January 1, 1909; each amendment of any such rule and a sworn state-

ment of the facts and expert opinions and estimates upon which amendment is based shall be filed with the Public Service Commission before it is used by the accounting corporation, and shall show the date when it is to be effective. Such rules and statements shall be filed upon sheets nine and one half inches by twelve inches, and shall be entitled 'Rule of the — (here naming the accounting corporation) — concerning amortization of capital.'"

"*Note B.* When any capital is retired from service, the amount (estimated if not known) originally charged to a capital account in respect thereof shall be credited to such capital account, and (except as provided in Account No. G-100, 'Fixed Capital, December 31, 1908'), the original money cost of such capital, less salvage, if any, shall be charged to the reserve account, 'Accrued Amortization of Capital,' any necessary adjusting entry being made in the proper account under 'Corporate Surplus or Deficit.' When capital is substantially continuous and cannot be satisfactorily individualized, it shall be kept in efficient operating condition through repair, and the renewals and replacements of parts thereof shall be considered repairs. In the case of buildings, towers, bridges, trestles and other separate structures, capable of being readily individualized, charges to this account must be sufficient to provide (in respect of such capital, and except as provided in Account G-100, 'Fixed Capital, December 31, 1908'), in the account, 'Accrued Amortization of Capital,' by the time such structures go out of service, a reserve equal to the original money cost thereof, less salvage, to which account such original cost, less salvage, shall be charged."

"*Amortization of Landed Capital, Page 50.* Charge to this account at the close of any fiscal period such portion of the original money cost (estimated if not known) of landed capital as is necessary to cover the proportion of the life thereof expired during such period."

"*Note A.* The amounts charged to this account shall be concurrently credited to Account No. 374, 'Accrued Amortization of Capital.'

"*Note B.* When any landed capital expires or is otherwise retired from service, (as, *e.g.*, through sale), the capital account, or other indicant account (if any), originally charged therewith, shall be credited with the amount originally charged, the account 'Accrued Amortization of Capital' shall be debited with all amounts theretofore credited to such account in respect of such landed capital so going out of service, the appropriate account shall be debited with the proceeds of sale (if any), and any necessary adjustments shall be made through the 'Corporate Surplus or Deficit account.'"

Amortization of Patents.

Many classes of business are based upon the value of patent rights, and oftentimes the company for manufacturing under such

patents is not formed until after the expiration of a considerable portion of the life of the patent, leaving but a short term of years upon which to work. As the expiration of each year reduces this life, so should an amortization fund be provided for such a patent in order to keep the investment intact at the end of its term. Many corporations carry the value of their patents at a nominal sum, thus not capitalizing them at all.

It is not necessarily the case that a company whose business is based upon patents has to retire upon the expiration of its rights, for, in many cases, the business has been so well established that, even with strong competition in the field, the business grows in extent from its own momentum and, if properly cared for, may remain quite as profitable as before the expiration of its grants. Even with the best of patent rights, the quality of protection given by the owners and the quality also of the business management have much to do with the success.

The following extract from Treasury Decisions shows how the Government looks upon the Amortization of patents on account of the Special Excise Tax.

"46. Receipts from sale of patent rights to be included in income.

* * * * * * *

"61. Royalties on patent rights to be reported as income. Allowance for depreciation of patents expiring during year, however, will be allowed." (Internal Revenue T. D. 1742, Dec. 15, 1911.)

CHAPTER X

HANDLING OF DEPRECIATION FUNDS

There are several ways of handling the depreciation funds, among which are the following:

(*a*) Carrying the depreciation fund as a part of the surplus earnings.

(*b*) Carrying a cash fund in a bank or trust company, which can be called upon at any time to pay for renewals.

(*c*) Setting aside a part of the profits as a depreciation fund which may be used in the business for extensions instead of calling in outside capital.

The depreciation of a property is chargeable to operating expense, and after a determination of the amount should be so charged each month. Whether this amount shall be credited to a surplus account, or be deposited as a cash asset in a bank or trust company, will be governed by local circumstances. If the public has any interest in the charge, it is probable that a deposit of the fund with a bank or trust company will be the best policy, even though it is plain to be seen that more profit can be made by retaining the amount in the business, for the public will have more confidence in the corporation when it sees that there is money ready for all renewals.

Another way somewhat resembling the last is to invest the depreciation surplus in outside securities instead of depositing it in a bank. This is done in order to produce additional income, but it is seldom that such investment can be made to produce as much as could be obtained from the use of the same amount in the business itself.

Another way that has been suggested is to set aside the surplus either in a bank, or some other institution, then when it becomes necessary to borrow money for business purposes borrow from this fund rather than from an outsider, paying the fund the regular interest rate. This would leave the depreciation account empty as far as having any funds ready to make renewals was concerned, but it should be easy to borrow for the fund, using the accumulated

interest for the new loan. As such a fund is a surplus, it will be obvious that no charge can be made against it for interest or other expense in the rates, but should it be used for extending the business and result in increasing the income, then, in case of publicly regulated public utilities, the rates may be reduced, for the public should not be called upon to pay profits upon money which it has itself already contributed.

Quotations below show how some states treat these reserves, and these are followed by a discussion of the question by Herbert Stockwell, in his paper at the convention of the National Association of Chartered Accountants.

Railroad Commission of the State of Wisconsin

"*Required Reserves — Depreciation Reserve.* To this account shall be credited monthly, or as they are made, all charges to the depreciation account of the individual operating systems (hereinbefore described), the income from the investment of any money, or from any security belonging to the depreciation reserve and any other appropriation which may have been made to it.

"When through wear and tear in service casualty, inadequacy, supersession or obsolescence, any building, structure, facility or unit of equipment originally charged to capital is no longer economically reparable, and in order to keep the productive capacity of the plant up to its original or equivalent state of efficiency, it is necessary to make a complete replacement of such buildings, structure or unit of equipment, the money cost of the original unit replaced and charged to capital (estimated, if not known, and if estimated the basis thereof shall be shown in the record entry), shall be charged to the depreciation reserve and the excess cost of the substituted unit over such original unit shall be charged to the appropriate capital account.

"When any building, structure, facility or unit of equipment originally charged to capital is retired from service and not replaced by any other unit of similar nature or equivalent thereto, the original money cost thereof (estimated if not known, and if estimated the basis thereof shall be shown in the record entry), shall be charged to capital in respect to such unit so being retired shall be credited to the capital account to which it was originally charged, and any adjustments necessary made through the surplus account.

"The salvage or scrap value of any unit of equipment retired from service or replaced by any other unit will be credited to this account.

"An analysis of the charges and credits to this reserve will be called for in the annual report to the Railroad Commission. This analysis will show the charges and credits with respect to each operating system,

and the nature of the charges with respect to the class of tangible capital for whom they are made."

"*Amortization Reserve.* This account shall be raised to provide for the amortization of intangible capital in service. To it shall be credited monthly, or as they are made, all the amounts charged from time to time through operating expenses to the account 'Amortization Reserve Requirements,' which account is to be set up where the nature of the capital occasions the setting up of this reserve. Such reserve shall also be credited with all accumulations resulting from the investment of any moneys or the interest or dividends from any securities belonging to it.

"An analysis of the charges and credits to this reserve will be called for in the annual report to the Railroad Commission.

"*Optional Reserves — Maintenance Reserves.* This reserve may be raised by those telephone utilities which operate equipment the repairs to which are occasioned only at remote intervals and are then so considerable in amount as to cause wide fluctuations in the operating expenses for the division of operation or the group of expenses of which the maintenance account in question is a part.

"*Depreciation.* Every public utility shall carry a proper and adequate depreciation reserve to cover the full replacement of all tangible capital in service. There shall be opened a depreciation account for each operating system of the utility to which shall be charged monthly, crediting depreciation reserve, an amount equal to one twelfth of the estimated annual depreciation of the tangible capital in service of the operating system, or as near that amount as the finances of the property will permit. Tangible capital comprises all land and its improvements and all interest in land the term of enjoyment of which is one year or more from the date of grant, buildings and structures and all equipment and apparatus used and useful in the furnishing of telephone service and having an expectation of life in service of more than one year. Hand and other small portable tools, because of their liability to loss and theft, are to be treated as part of the operating expenses of the year in which they were purchased. The estimate here required shall be made upon a rule designed to effect by its uniform application during the life of the tangible capital in service a charge into operating expenses of the total original cost of such capital less its salvage or scrap value upon retirement."

The State Railway Commission of the state of Nebraska issues a circular in which the following is given regarding depreciation reserve:

"Charges against this account should be made during the operating year when money is paid out on account of operating equipment discarded as useless and replaced."

The explanation of the liability account called *Depreciation Reserve,* is:

"This account should be credited with the total amount that the reporting company carries into the new year by reason of the asset account not being reduced to the present true value as of July 1, 1909. It is preferable that the asset account should be depreciated in the opening trial balance rather than be put in at higher values than the condition of the plant justifies, and credit taken in the depreciation account for the amount the board of directors may think the plant should be reduced from the original cost. It is expected that by July 1, 1910, the commission will be able to suggest some depreciation percentages which can be used for a satisfactory basis for taking care of this matter."

Herbert G. Stockwell says in his paper before the Denver Convention of the National Association of Chartered Accountants:

Reserves Invested

"Regarding the showing of reserve investments on the asset side of a balance sheet, I do not find myself in harmony with those accountants who would urge upon corporations the necessity or even desirability of investing its reserves in outside securities. I am not now discussing the sinking fund investments, properly so called. No argument can be directed against the investment of annual installments made under the requirements of a mortgage contract. But a sinking fund reserve and its investment are not matters or accounts coming within the scope of this paper. I am now referring to the investment in outside securities of the amount set aside out of the profits of a corporation as reserves for depreciation, renewal and replacements.

"I see no reason for the investment of such amounts in anything other than the assets or working capital of the plant. It is a matter of common knowledge that the net income from safe investments is lower than the amount of what ought to be earned by a corporation in its own business. To say that a corporation should take money out of its business and invest it in securities producing a lower rate of income than is earned by that corporation is, to my mind, a mistaken notion, and carrying the reserve idea further than necessary.

"Some argue that a reserve for depreciation becomes a liability which must be met, and that the only safe way to insure the meeting of the liability is to invest the amount thereof in some standard security. Perhaps this would be true if there was, in truth, any such liability, but where does the liability arise, when does it mature, and to whom is the corporation liable for its reserves? If the reserves are anything other than a portion of the profits of the corporation, stamped and set out on accounts, I am not looking at the matter correctly.

"To charge a stipulated amount to the operating expenses as depreciation does not cause the corporation to lose any money, nor does it create a liability on the part of the corporation to any one for anything. So far as the effect on the liabilities is concerned the transfer might just as well be from 'Surplus Account' to an account called 'Surplus Account No. 2,' it being understood that the No. 2 account constitutes a safeguard against an overvaluation of the plant until it is entirely wound up. The splitting up of the amount so transferred producing charges to various operating expense accounts, does not change the character of the credited account, provided, of course, that the intention is the same in both cases.

"By far the greater portion of manufacturers do not consider the subject at all seriously. Others have in their minds that if any depreciation charges are made at all, the amount should be 10 per cent. You hear this from iron and steel, wood and lumber indiscriminately. The idea of 10 per cent as a depreciation charge seems to have taken hold of the manufacturer's mind in very much the same way as the foundryman's rule that 10 per cent of the weight of pig goes up the chimney.

"Very few writers attempt to give figures except with a wide range, and the reason for it is that no general rate of depreciation will apply to any class of corporations. The subject has been considered more or less seriously by several of the larger associations of manufacturers, and papers have been read and discussed. The American Paper and Pulp Association hopes to take the matter up shortly as an association matter. In the meantime, testimony by individual members of the association before a committee of House of Representatives recently seems to show that they believe that depreciation ought to be set at not less than 5 per cent of the cost of buildings and machinery."

W. B. Jackson in a paper on "Depreciation Reserves" has the following to say regarding the capitalization of replacement costs and reserves.

"By capitalizing replacement costs, the burden of carrying these costs is thrown upon the future without limit of time in cases of unlimited franchises, when this burden should have been borne by the past, except during the period in which a company is still in process of building up its business to a remunerative one.

"Most plant managers have not yet come to a full appreciation of the dire straits a plant must come to sooner or later if the depreciation appropriations or their equivalent are not systematically and intelligently attended to. We may consider, for example, a property having a large investment in pole lines. This may amount to as much as 10 per cent of the value of the plant. For the first ten years comparatively

few replacements of poles will be required, but during the next two years most of the poles may have to be replaced. Thus an average amount of money equal to almost 5 per cent of the plant investment may need to be expended each of these years for pole replacements alone, and other parts of the plant are surely and irrevocably coming to the same condition.

"The tendency of to-day is to make sweeping changes in plant and methods, to permit of less expensive or of improved service. On this account many excellent plants in good operating condition are shut down and the requisite power received from other sources. A company cannot well charge off of its capital account the value of such plants which may be comparatively new when they are put out of commission. The question is, what should be done regarding the capital value of such plants? Unless it is necessary to retain the plants in reserve, I believe they should be dismantled and the capital of the company reduced by the amount received from the sale of discarded machinery and other property. Then the difference between the amount received from their sale and their actual capital value to the company may still be continued as a true asset of the company, and that value be gradually charged off at the normal depreciation rate of the plants discarded, the capital of the company being reduced each year by actual liquidation of that amount. In other words, the situation is one wherein the regular depreciation appropriation is made on account of the property until the full cost of the discarded property is returned to the security holders."

Opinions

"The cost of reproduction is not always a fair measure of the present value of a plant which has been in use for many years. The items composing the plant depreciate in value from year to year in a varying degree. Some pieces of property, like real estate for instance, depreciate not at all, and sometimes, on the other hand, appreciate in value. But the reservoirs, the mains, the service pipes, structures upon real estate, standpipes, pumps, boilers, meters, tools and appliances of every kind begin to depreciate with more or less rapidity from the moment of their first use. It is not easy to fix at any given time the amount of depreciation of a plant whose component parts are of different ages, with different expectations of life. But it is clear that some substantial allowance for depreciation ought to have been made in this case." (Knoxville *v.* Knoxville Water Co. Decided July 4, 1909, 29 Sup. Ct. 151.)

"The company's original case was based upon an elaborate analysis of the cost of construction. To arrive at the present value of the plant large deductions were made on account of the depreciation. This depreciation was divided into complete depreciation and incomplete

depreciation. The complete depreciation represented that part of the original plant which, through destruction or obsolescence, had actually perished as useful property. The incomplete depreciation represented the impairment in value of the parts of the plant which remained in existence and were continued in use. It was urgently contended that, in fixing upon the value of the plant upon which the company was entitled to earn a reasonable return, the amounts of complete and incomplete depreciation should be added to the present value of the surviving parts. The court refused to approve this method, and we think properly refused." (Knoxville *v.* Knoxville Water Co., 29 Sup. Ct. 152.)

The London County Council *v.* Henry Edwards (Surveyor of Taxes)

"Mr. Justice Channell, in the course of delivering judgment, said that he had some difficulty in knowing what to do with the case. There was no question of law in the case at all, and on that ground the appeal ought to be dismissed; but he did not like to base his judgment solely on that ground, as the case had been argued and was of some importance. The question arose as to the deductions to be made on the assessment for income tax for the year ending 1904 in respect of the diminution in value of the tramway plant during the year of assessment by reason of wear and tear. The term 'depreciation,' although not strictly accurate, was a convenient form of expression for the phrase 'diminution in value by reason of wear and tear.' Under the statute deduction was allowed for that diminution in value, but in the case of this tramway undertaking, both when it was managed by private companies and also by the London County Council, it had been the practice, instead of making an estimate each year as required by the Act as to how much the plant had diminished in value by reason of wear and tear during that year, to allow to the owners for the time being of the undertaking the amount which they had actually paid for repairs and renewals during the year in question. As long as there was no change in the management of the undertaking there would not be much difference between the two ways of calculating the amount of deduction. It would in the long run come to the same thing. But the difficulty in using the practice actually adopted arose from the difficulty in ceasing to use it at any particular time. There was no security that the parties would agree to continue the practice. But apart from that difficulty there might be, as in the present case, a change in the mode of carrying on the undertaking. The London County Council complained that under the circumstances the practice told against them. People did not usually do all their repairs in one year, but did them from time to time; but sometimes it happened that the repairs in one particular

year amounted to very much more than in other years, and if the practice stopped just before one of these unusually heavy years, the amount that would be obtained would not be so great under the practice as under the estimate required by the statute. But that difficulty ought to have been foreseen when the practice was adopted. There was no objection to the practice, which was in point of fact a convenient manner of calculating the amount of depreciation. It was the mode of calculation adopted in the case of the 'Caledonian Railway Company v. Banks.' In the present case it was adopted down to the year of assessment. In that year there was change in the character of the undertaking as worked by the London County Council. They ceased to work it as a horse tramway and decided to work it by electric power. That necessitated a change in the plant. Cars had to be replaced, although they were not worn out, and practically the rails of all the lines which were to be worked by electric power were replaced. This was put down in the books as capital expenditure. This change gave rise to the present difficulty in assessing the allowance to be made for depreciation. The London County Council might have objected to the usual practice of calculating the depreciation when before the Commissioners, on the ground that it was not applicable under the altered circumstances. If they had done so the surveyor of taxes could not have objected to the estimate being made under the statute. But they thought they would be better off in continuing the practice. The result was that no evidence was given before the Commissioners as to the actual depreciation by reason of wear and tear during the particular year. The parties thought that the old practice was to be applied, but in his Lordship's opinion that practice was not applicable. The practice was to allow the amounts actually expended for repairs and removals. But in the year in question no sum at all was spent on renewing or repairing the plant. What was done was that as regards the tramways which were altered so as to be worked by electric power nothing was spent for renewals, inasmuch as a different thing was substituted for the former tramlines; therefore, if the old practice was applied strictly, the London County Council would not get anything. What in fact had been done was to give the London County Council the amount which they would have spent on the renewals of the old system of horse tramways. If the old system had continued to have been used, and as five miles of rails were worn out, these would have had to have been renewed, and an expenditure for that purpose would have had to have been incurred if the works had continued to have been used as formerly. His Lordship thought that it was doubtful whether the appellants were actually entitled to that sum. It was clear that they could not get an allowance for what they had failed to get in former years, nor an allowance for what

they would fail to get in future years owing to the alteration; they were confined to the depreciation in the year of assessment. The result was that the London County Council had got, in his opinion, all they could have got if the old practice was applied strictly, but nevertheless they were dissatisfied. They now said that the estimation under the statute ought to be applied, and it was suggested that the case should be sent back to the Commissioners to assess the amount of estimated depreciation under the statute. His Lordship did not think he could do that unless the Commissioners had gone wrong on a question of law. They had dealt with the question either rightly, or if wrongly, it was to the advantage of the appellants, and therefore the appellants could not complain of the decision of the Commissioners. Even if the case was sent back his Lordship did not think it would be of much advantage to the appellants. It was a question of fact as to the amount of depreciation, and in this case there would be practically no diminution in value during the year in question, because the relaid lines were only used during one month. The appeal only raised a question of fact; further, the London County Council had received all that they were entitled to under the practice adopted in former years; and as regards sending the case back, the appellants had been heard, and it was now impossible to go into the figures. For all these reasons the appeal must therefore be dismissed."

CHAPTER XI

APPRECIATION

Land owned by Public Utilities Corporations often, it may be said almost invariably, increases in value to a very considerable extent during the life of the plant. Again, the prices on some portions of a plant, such as copper wire, cast-iron pipe, and other commodities, may be higher at the time of appraisal than when erected. The courts have decided that this increment belongs to the corporation in a valuation, the same as depreciation in prices would effect a lessening of value.

Such appreciation should be carried in surplus until such times as the property changes hands, when it can be distributed among the stockholders. One can imagine a case of increase of value such that set rates would no longer pay the interest or dividends upon the value. Factory sites oftentimes so increase in value that it is good economy to sell the site and move to a new location and build new factories with money received for the old.

Interstate Commerce Commission. Commissioner Lane.

"Whatever the true economic or legal view may be as to the right of a carrier to consider the increase in value of its land as a part of the value upon which it is entitled to a reasonable return, such increase in value does not of itself establish the right of a carrier to increase rates upon a given service. Certainly if the Supreme Court may decline to lay down the absolute rule that 'in every case failure to produce some profit to those who have invested their money in the building of a road is conclusive that the tariff is unjust and unreasonable' (Reagan *v.* Farmers' Loan & Trust Co., 154 U. S., 412), it is a conservative statement of the law to hold that a railroad may not increase the rates upon a number of commodities solely because its real estate has risen in value." *Western Advanced Rate Cong.* (20 I. C. C. Rep. 344, decided Feb. 22, 1911).

CHAPTER XII

FRANCHISE

Definition:

The best definition of franchise that the writer has yet found is the one given in the decision of the Federal Court in the Consolidated Gas Case (157 Fed. 373).

> "The franchise is but a part of the power or privilege of sovereignty allotted to a private person for the benefit of all, and only incidentally given for private emoluments."

In 1893 the Supreme Court, in the case of the Monongahela Navigation Co. *v.* United States, said (13 Sup. Ct. 632):

> "The franchise is a vested right. The state has power to grant it. It may retake it, as it may take other private property, for public uses, upon the payment of just compensation. A like, though a superior, power exists in the national government. It may take it for public purposes, and take it even against the will of the State; but it can no more take the franchise which the State has given than it can any private property belonging to an individual."

Judge Savage, in his opinion in the case of Kennebec Water District, in giving instructions to the appraisers, had the following to say:

> "A franchise is property, and it has value. In this case the franchises have value in themselves, inasmuch as they give the owner the privilege of doing what is called a 'profitable business.' We have already shown that the existence of such franchises may also enhance the value of the plant by which they are exercised. It should be remembered, however, that a franchise has only one appraisable value, and care should be taken that that value is appraised only once." (Kennebec Water District *v.* City of Waterville, 54 Atl. Rep. 19.)

In another opinion given with instructions to appraisers as to valuations in the Brunswick Case, Judge Savage outlined the especial value to be placed on a franchise such as that owned in

connection with the other property of the Maine Water Co., as follows:

"But, again, it is not only a structure, and a structure being used, but it is a structure built, maintained, and used by authority expressly granted to the company by the State; that is, it was built and is maintained and used by virtue of a franchise or franchises. The structure is lawfully in existence, and may rightfully continue to be used as a going concern structure, until the State determines otherwise. This also makes the structure in use more valuable. It is the difference between a structure existing by sufferance and one maintained by right. The franchise, however, is a limited one. It is not perpetual. It may be recalled by the State. It is not exclusive. Other and competing franchises may be granted. It is not absolute. The right may be limited or qualified by express enactment. One franchise is limited in the nature of things, and that is the franchise to charge tolls or rates for water furnished. It cannot charge arbitrary rates beyond the power of revision. It may not, as we have seen, under some circumstances charge rates even fairly remunerative upon the investment. It can only charge reasonable rates in any event A franchise may exist entirely independent of the structure. There may be franchises when there is no structure. This water company may have franchises within this district which are not connected with the use of the structure which the district has taken. Of that we have no knowledge. But so far as the structure is maintained and used by virtue of a franchise, that fact may add to the value of the structure. One would be likely to pay more for it as a structure if it could be rightfully used than he would if it could not. What is it, then, that the district is taking, and for which the company is entitled to just compensation? It is a structure in actual use, and with a right on the part of its owner to so use it, and to charge reasonable rates to customers for services rendered." (Brunswick and Topham Water District *v.* Maine Water Co., 59 Atl. Rep. 539.)

According to the most modern treatment of Public Service Commissions, a franchise is a privilege given by the community to a private person — or corporation — for use of the public property for the benefit of the public, and only incidentally is it the intention of the community in granting such a right, to allow the person accepting the same enough profit to insure his willingness to take advantage of it by investing in plant to make use of the grant.

Perpetual franchises have been granted in many states in the past, notably New York and Pennsylvania, and in some other

states. This irrevocable binding of future generations is no longer in vogue, and, perhaps happily, has been avoided in nearly all the newer states by granting term franchises, and in many of the states these terms have been very short.

Some of the objections to the perpetual franchise are, that it is almost impossible to regulate or control in any way the actions of the corporations owning the same, and it can be taken away from the company only by invoking the power of eminent domain and paying for the capitalized value of the prospective net earnings for all time, in addition to paying for the value of the physical property. This is a long, tedious, and costly process, and is very discouraging to any community.

It is dangerous, too, from a lack of knowledge of the future requirements of the community; for who can say what changes will be necessary for any city in the years to come? In a great many places a perpetual franchise often stands as "a dog in the manger" to prevent progress, or is taken advantage of by promoters to extort money by reorganization and heavy capitalization, thus necessitating high rates, or making poor service, and almost always produces an indifference to public requirements.

In the hands of a progressive company, however, it has one advantage, and that is, the fact that such a company having a perpetual franchise will often build far ahead of the present requirements, feeling secure in its ownership and trusting to the future for adequate earnings on such extensions.

Some of the main disadvantages of the short-term franchises are, first, the very considerable difficulty in financing the projects without undue liberality as to bonuses and discounts on securities. Next, a grand political tearing up of a whole community at short periods, and often lasting for years and resulting in intensely bitter feeling between the Company and the public; and, in addition to this, not only leaving doubts in the minds of the Company officials as to the advisability of making much-needed extensions, but rendering it increasingly difficult to induce capital to come in for such additions.

If, as in many cases, there be no provision in the franchise for purchase of the property by the community at the end of the term, the very natural tendency is, to let the property deteriorate as it will, and spend as little money on repairs as possible and maintain any kind of service. In a properly managed company, it would also be necessary to set aside a sinking fund for amortiz-

ing all the capital that could not be recovered by selling the property for junk, so that the investor should get his investment back intact. This is legal and correct, and any company operating under a short-term franchise, or, in fact, under a franchise of any limited term, would be criminally foolish to take the chance that the franchise would necessarily be renewed at the end of the term. And yet that is what is being done by the great majority of public service corporations in the country. Regarding this amortization fund for retirement of the investment at the expiration of the franchise, some calculations are given in a previous chapter, going to show that a short-term franchise is sure to be more costly to the community than one of a considerable number of years, by reason of the much larger charge to the retirement fund.

A limited term franchise is almost invariably accompanied by many conditions providing for the performance of all manner of things by the company, such as paving between tracks and for a foot or more outside of rails, keeping pavement in repair, watering streets, removal of snow and ice from the tracks; regulations as to rates, transfers and service, and many others, many or all of which are liable to be entirely neglected as the end of the franchise approaches. It is simply impossible for any community in the United States to formulate any conditions for the future which shall hold good as a whole.

The only advantage of a limited-term franchise is, that it gives a community the chance to purchase the utility at the end of comparatively short periods, or to impose new regulations and requirements.

The *indeterminate franchise* is now under full discussion, and has been adopted by Wisconsin, and practically so by the state of New York, and has been in use in Massachusetts ever since public utilities have existed in that Commonwealth.

The definition of the *indeterminate franchise* is briefly, a permit issued by the proper authorities, which is good during good behavior and may be terminated by the authorities at any time by paying the fair value of the property exclusive of franchise. In Massachusetts the permit is revocable at any time, but no provision is made for taking over the property at any value. This has resulted in the permits becoming virtually perpetual franchises, as none has ever been revoked.

The fundamental principle of the indeterminate franchise is

that it gives the right of acquisition by the community of all the property of the corporation at a fair value to be determined by competent parties, usually a Public Service Commission, but subject to hearing and to criticism. Thus a community may rid itself of an objectionable corporation by purchasing the property, which it may operate itself, sell, or lease to another corporation under more favorable control.

So far, indeterminate franchises have been given only in states where a Public Service Commission controls, and this form of franchise lends itself easily to the control of such commissions, thus doing away with the need for terms and conditions that were almost invariably the accompaniment of the old forms. A commission can, by virtue of its very existence, regulate the service and rates of any public utility, and, what is further, may regulate the granting of franchises to other and competing corporations, thus in a great measure protecting investments.

In the past, franchises of public utilities have been capitalized in a great majority of instances, excepting only in the Commonwealth of Massachusetts; and quite naturally it has been the endeavor to earn dividends on such capitalization. From recent decisions of the Supreme Court of the United States, and from the fact that practically all the laws creating Public Service Commissions include clauses forbidding the capitalization of franchises, it would seem as if this would cease for the future, even in those states having no commissions with powers.

In Oregon, franchises are to be treated in a somewhat different manner than they are elsewhere if the Single Tax laws proposed for that Commonwealth are carried. Where in other states the authorities are endeavoring to convince the public utilities corporations that a franchise given by a community has no value for capitalization, in Oregon the public expects to carefully determine the value and the increase in value of each and every franchise, all increase being taken by the state authorities as the unearned increment and as tax on the land, or the *single tax* on the whole property.

Following are a number of abstracts from court decisions and from laws creating public service commissions bearing upon the subject.

"The commission shall have no power to authorize the capitalization of any franchise to be a corporation or to authorize the capitaliza-

tion of any franchise or the right to own, operate or enjoy any franchise whatsoever in excess of the amount (exclusive of any tax or annual charge) actually paid to the State or to a political subdivision thereof as the consideration for the grant of such franchise or right. . . ." (From Section 55 Public Service Commission Law of New York, Chapter 429, Laws 1907, as amended; renewed and made part of the Consolidated laws by Chapter 480 of the Laws of 1910.)

The Wisconsin Railroad Commission, in the Antigo Water and the Marinette Telephone cases, says:

"The theory of the Wisconsin public utilities law is that rates shall be reasonable and shall not be greater than enough to yield a fair return on the investment. In determining the investment as a preliminary process to the fixing of rates, the commission had to deal with the claims of large 'intangible' franchise values as well as 'going values,' in both the Antigo water case and the Marinette telephone case. Regarding the former, the Commission holds that if the municipality required the payment of money or its equivalent, or there was necessary legitimate payment made for the franchise, then the sum which may be reasonably said to have been paid for the franchise may be included in the valuation, the same as money necessarily invested in physical property. But the Commission refuses to consider the claims of some experts and corporations that franchises for which no money was paid may have 'intangible' values which should be considered in the making of rates."

And again in the Consolidated Gas Case:

"It may be noted in passing that the now generally accepted view is that the plant value upon which a fair return must be earned is the present cost of duplicating the existing plant (less depreciation) and not its actual original cost. It is not material, therefore, what the original outlay for franchise may have been, but it is important to know what moneys, if any, would not have to be expended to secure such a franchise. Neither are past losses or profits conclusive further than as they throw light upon probable future earnings."

"The court further stated that it does not appear in the evidence how the valuation of the franchises was measured, or why the figures selected were chosen, but that it was true that, when complainant was organized in 1884, under the consolidation statute, which, in terms, permitted it to acquire the property and franchises of the other companies, it issued stock of the par value of $7,781,000 representing the franchises it then acquired and nothing else, and that the stock was held by purchasers who, I am compelled to think, had a right to rely upon legal protection for legally issued stock. It is not, of course, contended there was special stock issued for this particular item, but it was included in the total

sum for which the consolidated company issued its stock, and, upon its receipt, the stockholders in the various companies surrendered their stock in those companies. The result was that the amount of the stock issued by the consolidated company was increased by $7,781,000, representing a value of franchises which was agreed upon by the stockholders in the companies, and which had never cost any of them a single penny.

"It cannot be disputed that franchises of this nature are property and cannot be taken or used by others without compensation. Monongahela Navigation Co. *v.* United States, 148 U.S. 312, L. ed. 463, 13 Sup. Ct. Rep. 622; People *v.* O'Brien, 111 N. Y. 1, 2 L. R. A. 255, 7 Am. St. Rep. 684, 18 N. E. 692, and cases cited. The important question is always one of value." (Willcox *v.* Consolidated Gas Co., 29 Sup. Ct. 196.)

"But there is, however, no method of valuing franchises, except by a consideration of earnings." (Same, p. 197.)

* * * * * * *

"We are not prepared to hold with the court below as to the increased value which it attributes to the franchises. It is not only too much a matter of pure speculation, but we think it is also opposed to the principle upon which such valuation should be made. This corporation is one of that class which is subject to regulation by the legislature in the matter of rates, provided they are not made so low as to be confiscatory. The franchises granted the various companies and held by complainant consisted in the right to open the streets of the city and lay down mains and use them to supply gas, subject to the legislative right to so regulate the price for the gas as to permit not more than a fair return (regard being had to the risk of the business) upon the reasonable value of the property at the time it is being used for the public." (Same, 197.)

"What has been said herein regarding the value of the franchises in this case has been necessarily founded upon its own peculiar facts, and the decision thereon can form no precedent in regard to the valuation of franchises generally, where the facts are not similar to those in the case before us. We simply accept the sum named as the value under the circumstances." (Same, 198.)

"The complainant also contends that the state, having taxed it upon its franchises, cannot be heard to deny their existence or their value as taxed.

"The fact that the state has taxed the company upon its franchises at a greater value than is awarded them here is not material. Those taxes, even if founded upon an erroneous valuation, were properly treated by the company as part of its operating expenses, to be paid out of its earnings before the net amount could be arrived at applicable to dividends, and, if such latter sums were not sufficient to permit the proper return on the property used by the company for the public, then the rate would be inadequate. The future assessment of the

value of the franchises, it is presumed, will be much lessened if it is seen that the great profits upon which that value was based are largely reduced by legislative action. In that way, the consumer will be benefited by paying a reduced sum (although indirectly) for taxes." (Willcox *v.* Consolidated Gas Co., 29 Sup. Ct. Rep. 199.)

"The right to place gas mains in the streets of New York and maintain them for private profit is in and of itself something upon or from which an income return may be justly and lawfully demanded, a return different and separable from that derived from all the company's tangible property or any part thereof. It is not asserted that any right such as above described was ever bought by complainant from either state or city, or that for such right any valuable consideration was ever paid in the usual legal sense of the words. Indeed, the asserted rights all date from that time in American economics when those promoting public works were regarded as public benefactors, and the right to serve the public was something thought to be sufficiently paid for by the act of service. In these later days, however, complainant, finding itself treated rather as a malefactor than a benefactor, brings this action to ascertain, *inter alia*, whether the latest statutory rate leaves it a fair return not only upon its tangible property, but upon the right to use that property in the gas business, which right is commonly called a franchise. As an original proposition I believe this claim unsound. Return can be expected only from investment, and he that invests must part with something in the act of investing. He that hath not sown shall not reap, and can it be said that complainant here, or any other corporation similarly situated, has invested its franchise in its business? It did not invest in its franchise because it did not pay for it, it did not invest its franchise because it did not part with it in the same way that it parted with money or money's worth in acquiring or creating mains or plants. The investment of property was made not in the franchise, but under the franchise, and on the faith thereof." (Willcox *v.* Consolidated Gas Co., 157 Fed. Rep. 873.)

"A corporation maintaining a public highway, although it owns the property it employs for accomplishing public objects, must be held to have accepted its rights, privileges, and franchises subject to the condition that the government creating it, or the government within whose limits it conducts its business, may, by legislation, protect the people against unreasonable charges for the services rendered by it. It cannot be assumed that any railroad corporation, accepting franchises, rights and privileges at the hands of the public, ever supposed that it acquired, or that it was intended to grant to it, the power to construct and maintain a public highway simply for its benefit, without regard to the rights of the public. But it is equally true that the corporation

performing such public services, and the people financially interested in its business and affairs, have rights that may not be invaded by legislative enactment in disregard of the fundamental guaranties for the protection of property. The corporation may not be required to use its property for the benefit of the public without receiving just compensation for the services rendered by it." (Smith *v.* Ames, 18 Sup. Ct. 433.)

Regarding franchises, Benezette Williams said in discussing a paper by J. W. Alvord before the American Waterworks Association in June, 1909:

"The older conception of what are now known as public service corporations, and public utilities, which was based upon the theory that a company operating under a special grant from some legislative authority was its own master, and not subject to rate regulation or control, is fast giving place to a newer and sounder one. Franchises, or grants conferring special privileges, were and still are, so far as they extend to definite matters, considered property which may have value or not, depending upon whether the business authorized is profitable or unprofitable.

"The modern conception is that its sole function is to serve the public, and that it is entitled to a revenue sufficient for operation, maintenance, renewals and an adequate return on the capital invested, which carries with it governmental regulation of rates and control as to the character of the service rendered, the franchise under which it operates being indeterminate, and hence not property in the older meaning of the term.

"If the modern conception had even partially prevailed a generation ago, and a joint responsibility had been established between the public and private agencies that brought public utilities into being, the franchises providing that at the expiration of the contracts the utilities should be taken over by the public authorities at a price equal to the actual amount of the investment without depreciation, or that the franchise should be renewed, the complications now experienced in the valuation of such utilities would scarcely have arisen. If this had been done, courts would not have rendered decisions insisting that the rates charged by public service corporations must be reasonable, but giving us no clew as to how the reasonableness of rates can be determined."

"What is the value of a franchise to perform a certain service, under which no money is invested and no service yet performed? What is it worth apart from performance under it?

"Unless it can be seen to possess inherent value entirely apart from the earning capacity of the subsequent investment or from the actual

earnings resulting from such investment, the value asserted or claimed is but a duplication of that derived from the use of the tangible property when so invested.

"The concepts of the nature and value of franchises are seen dimly and confusedly because of the failure to distinguish between productive and nonproductive property. Land, money, chattels may by industry and intelligence be made productive without a franchise; but no excellence in these desirable qualities can ultimately render a franchise productive without the use of money, chattels and land in connection therewith, and when the juncture is made the earning capacity of the real and personal property, plus the franchise and plus intelligence and industry, is really no greater than it would be without the franchise, for the franchise has added no producing power to the realty or personalty; it has but authorized their employment in a particular way and protected the owners while so employing them."

As an indication of the change of opinion that has come over the court in the past few years, I append a number of decisions going to show that in the past franchise value was often recognized.

In the case of Monongahela Co. *v.* U. S., March 27, 1893, where Congress had provided that, in the taking over of a lock and dam belonging to the company, no compensation should be made for the franchise of the corporation giving it the privilege of taking toll; the Supreme Court of the United States held that compensation for the franchise must be given; Justice Brewer, in stating the opinion of the court, said:

"We are not, therefore, concluded by the declaration in the Act that the franchise to collect tolls is not to be considered in estimating the sum to be paid for the property. . . . If a man's house must be taken, that must be paid for; and, if the property is held and improved under a franchise from the state, with power to take tolls, that franchise must be paid for, because it is a substantial element in the value of the property taken. So, coming to the case before us, while the power of Congress to take this property is unquestionable, yet the power to take is subject to the constitutional limitation of just compensation. . . . How shall just compensation for this lock and dam be determined? . . . The value of property, generally speaking, is determined by its productiveness, the profits which its use brings to the owners. . . . The value, therefore, is not determined by the mere cost of construction, but more by what the completed structure brings in the way of earnings to its owner. . . . The prices which may be exacted under this legislative grant of authority are the tolls, and these

tolls, in the nature of the case, must enter into and largely determine the matter of value." (Monongahela Co. *v.* United States, 148 U. S. 312.)

A later case in the Supreme Court of the United States shows how valuable a public-service franchise may come to be in comparison with the tangible property by means of which it is used. In this case, the city of Brooklyn took the plant, property and franchises of a water-supply company, and the commissioners appointed to value these items awarded the sum of $370,000 for the tangible property of the company, and $200,000 for its franchises and contracts. The basis of franchise valuation was stated as follows, and this was sustained:

"To recapitulate what has just been said, we have valued the franchise upon the assumptions (1) that at present the water company alone has the right publicly to purvey water in the Twenty-sixth Ward; (2) that the exclusiveness now incident to its right may at any time be taken from it by the Legislature, or by local authorities acting under legislation; but (3) that neither the Legislature nor local authorities would, in determining whether to take from the company the exclusiveness of its right, fail to have such due regard as is demanded by ample and fair public policy, to the past investment, risks and services of the company and to the reasonably just expectations which those who have invested money in its work had in mind when so investing." (Long Island Water Supply Co. *v.* Brooklyn, 166 United States 685.)

"The vice of it consists in the fact that it substituted one of the elements of damages for the measure of damages itself. The bridge structure, the stone, iron, and wood, was but a portion of the property owned by the bridge company, and taken by the county. There were the franchises of the company, including the right to take toll, and these were as effectually taken as was the bridge itself. Hence, to measure the damages by the mere cost of building the bridge would be to deprive the company of any compensation for the construction of its franchises. The latter can no more be taken without compensation than can its tangible, corporeal property. Their value necessarily depends upon their productiveness. If they yield no money return over expenditures, they would possess little if any present value. If, however, they yield a revenue over and above expenses, they possess a present value, the amount of which depends in a measure upon the excess of revenue. Hence it is manifest that the income from the bridge was a necessary and proper subject of inquiry before the jury. The court permitted the plaintiff to prove the receipts for, say, five

years before the taking, but denied the defendant's permission to extend the inquiry back to the time of the organization of the company. We perceive no error in this ruling. . . . Its value at the time of the taking is the rule. . . . The county might perhaps have built a new bridge at another street for half the money, but it did not do so; it elected to take the property of the bridge company, and the inquiry under such circumstances is not what it is worth to the party taking, but its value to the company that is deprived of its property." (Montgomery County *v.* Schuylkill Bridge Co., 110 Pa. State 54–58. 20 Atl. Rep. 407.)

FRANCHISE TAX

When, as in New York, franchises are taxed at a large value computed by a tax commission, it would seem equitable that they should also return dividends, or at least be represented by some amount in the capitalization. In New York, though, it is as broad as it is long, as the income on the actual investment is practically guaranteed, the public naturally has to stand whatever charge is made for taxes on the franchise before calculating the guaranteed dividend and the company might as well be allowed to place a capital value on the privilege.

Below will be found a description of the method used for arriving at the value of public service franchises as practiced by the Ford Franchise Commission.

From Decision of Court of Appeals of New York in Jamaica Bay Company Case

"Justice Willard Bartlett has done what the corporation counsel requested the court to do. He has given a decision to serve as a general guide in determining the amount of special franchise taxes.

* * * * * * *

"On behalf of the State and the city it was argued by the corporation counsel in the test case of the Jamaica Bay Company that the method for valuation was generally to find the net earnings, then to value tangible property, deduct from the net earnings a fair return on the present value of the tangible property, and by this process of elimination, determine the portion of the earnings derived from the franchise. Then to capitalize that portion of the earnings on the basis of the sum which business men familiar with the proposition regarded as a fair return. The principal thus found thus measures the value of the intangible franchise right, and to this sum there is added, under the law, the value of the tangible property in the streets."

Based on the Report of the Referee in the Case of New York State v. Third Avenue Railway Company

The Method is the One Commonly Employed by the Ford Tax Franchise Commission and has been Approved by the Supreme Court of the United States

First determine the gross earnings from operation for the year ending at the date for which it is wished to complete the books. Next, from these gross earnings deduct the total operating expenses, leaving the gross income from operation. Deduct from the gross income for operation taxes upon the property, depreciation for the whole property, and a dividend of, say, 5 or 6 per cent such as the company may be entitled to, this dividend to be computed upon the physical valuation of the property.

After deducting these last-mentioned amounts from the gross income, capitalize the balance at the current rate of interest in the locality, usually 6 per cent, and to this capitalization add the value of the physical plant that is in the streets. This sum then becomes the value of the special franchise under which the public utility is operated.

An Example of the Method used for Determining the Franchise Value for Tax by the Ford Franchise Tax Commission of New York

A Street Railway

Gross Earnings (say)		$5,000,000
Operating Expenses		4,000,000
Gross Income		1,000,000
Taxes	$150,000	
Depreciation	200,000	
Dividend on value of property as for appraisal, 5 per cent on $8,000,000	400,000	750,000
Net Income		$250,000
Capitalized at 5 per cent		5,000,000
Add value of that part of physical property in the streets (say)		2,500,000
Value of franchise for taxation		$7,500,000

Chicago Method of Computing Franchise Value

The method here described was devised by the Board of Supervising Engineers for valuing the unexpired franchises of the several street railway systems of Chicago. Each of these companies

was composed of a number of lines, nearly all having franchises that expired at different dates.

The data necessary for this computation are as follows:

(*a*) Name of street covered by franchise.

(*b*) Limits between which the franchise extends.

(*c*) Dates the franchise expires on different routes.

(*d*) Miles of single track on the street.

(*e*) Car miles operated over each track, computed from trip sheet of the company.

(*f*) Gross passenger earnings for each track as listed.

(*g*) Net earnings for each track listed. This was determined by *assuming* that 30 per cent of the gross passenger earnings would be net, and adding to this the ratio of other net earnings. That is, the net passenger earnings (as above) for the year were added to the net earnings from other sources and the total was then divided by the gross passenger earnings for the year.

(*h*) The value *per mile* of all the physical property actually on the street, including track and special work, bridges and trestles, overhead constructions; the sum of all plus any percentage — in this case 10 per cent — was divided by the total single track milage.

(*i*) The value of all other investment, or that investment not on the street, calculated *per car mile* operated for the year ending the date of the appraisal; that is, the sums of the values of track in car houses and yards, electric power distribution system, telephone, feeder, cars, power plant, fixed tools and machinery, buildings, real estate, floating tools and supplies; was divided by the total car miles operated, giving a factor for apportioning values of property not on the street, among the different streets listed.

(*j*) The value of the property on each street was then determined by multiplying the miles of single track by the value per mile $= d \times h$, and adding to this the value of general property chargeable to the street, by multiplying the car miles by the rate per car mile $= e \times i$, then $j = (d \times h) + (e \times i)$.

(*k*) Interest at 5 per cent on the total value of the property as shown in column (*j*).

(*l*) Time (in years and days) the franchises have to run after the date of appraisal.

We now have all the data necessary for calculating the value of the franchise, and if it were wanted for one year only, the value would be the difference between the net earnings as shown in (*g*) and the interest given in (*k*), or $g - k$ = franchise value.

But for determining the value as of the dates of expiration it is necessary to compute the *present value* of the two items (g) and (k) for the time shown in (l). Again, as the earnings always increase from year to year it will be necessary to study the rate of increase in the particular region in which the property is located. This rate of increase has been called the "Arnold factor" and must be applied to the amount of the earnings for the year ending on the date of the appraisal, and be compounded year by year to the end of the term. The present value of each year's net earnings must be found by multiplying the amount by the present value of one dollar for the term remaining. It is better, though, to compute the present value of one dollar and apply to it the Arnold factor thus making one factor to be applied to the value of the net earnings for the time each franchise has remaining. As the earnings are available at short intervals during the year the average date of the middle of the year is used.

Next, the present value of a year's interest as in (k) must be found by multiplying the amount by the present value of one dollar for the time shown in (l). Interest is taken as at the end of the year. The value of the franchise, then, will be the difference between the *present value of the net earnings* and the *present value of the interest* as calculated above.

The method used by Professor H. C. Adams for determining the value of the unexpired franchises of the Detroit United Railways is best shown by quoting from his report as follows:

> "Commercially speaking, the basis of franchise value is the revenue which accrues from operation in excess of operating expenses and of the reasonable return upon the investment in the physical plant. This remainder is, in fact, a surplus revenue which, in case of a street railway operating on a franchise, is protected against competition by the terms of the ordinance concerned and provided the amount of this permanent excess profit can be determined for a year, the value of the underlying franchise is obtained by computing its present value for the number of years which a franchise has to run."

Regarding the increase in earnings by virtue of the increase in population, he has the following to say:

> "The above rule does not consider the increased value of the unexpired franchises due to the probable increase in the population of the city of Detroit. There is, of course, no way of computing this value. It is purely speculative."

The method used by Professor Adams in determining the value of the different franchises in Detroit, is applicable to that city and to such others as may have the same complication in franchises; but it is too much involved to describe here, although it may be said that it consists mainly in awarding to each franchise line the amount of net earnings as determined by a study of the car mileage and the passenger mileage, and is a tedious mathematical calculation by use of the traffic sheets turned in by the car reporters.

As to the power to tax franchises or in fact property of any kind the following, from an opinion of Chief Justice Marshall, seems to go far toward settling the matter. In the case of McCulloch *v.* Maryland, reported in the fourth volume of Wheaton's U. S. records, page 430, the Chief Justice said:

> "That the power to tax involves the power to destroy; that the power to destroy may defeat and render useless the power to create . . . are propositions not to be denied."

CHAPTER XIII

CAPITALIZATION

There can be no question to-day of the statement that the capitalization of a public service corporation must represent the actual but full cost of the property as it exists, and no more. There is no room for discussion of the fact that the physical property must be capitalized at what it has cost ready for operation; that if money has been paid for a permit or franchise that must also be added to the cost, and after the corporation becomes a *going concern*, it is perfectly regular and legal to add to the capital the reasonable cash cost of obtaining a *going value.*

Where the public utilities are under the control of a commission, it is now almost compulsory to build all additions to plant with new capital, and not with surplus earnings, on the theory that surplus earnings mean unnecessarily high rates, and it is the rate that the commission is bound to regulate to the extent that the corporation gets for its reward just a fair interest and no more, and all surplus earnings must be devoted to improving the service and not to increasing the plant. As a matter of fact, the settling of a rate to which the public utilities corporation is clearly entitled, in effect, acts somewhat as a guarantee by the community, and in fact is beginning to be so considered by the authorities.

It is practically impossible to regulate rates so closely as not to make some surplus without producing results that will at times amount to confiscation, and the ordinances in Chicago make use of this surplus to induce the companies to make extra effort for good service, by dividing it with the corporations. In Boston agreement has been made with the Gas Company that the price of gas and rate of profit shall be on a sliding scale, and that when the company reduces the rate five cents per thousand feet, it may the next year increase its dividend rate 1 per cent.

In the decree of the Supreme Court on the Consolidated Gas Case, the following regarding the setting of a fair rate of return was given:

> "There is no particular rate of compensation which must, in all cases and in all parts of the country, be regarded as sufficient for capi-

tal invested in business enterprises. Such compensation must depend greatly upon circumstances and locality; among other things, the amount of risk in the business is a most important factor, as well as the locality where the business is conducted, and the rate expected and usually realized there upon investments of a somewhat similar nature with regard to the risk attending them. There may be other matters which, in some cases, might also be properly taken into account in determining the rate which an investor might properly expect or hope to receive and which he would be entitled to without legislative interference. The less risk, the less right to any unusual returns upon the investments. One who invests his money in a business of a somewhat hazardous character is very properly held to have the right to a larger return, without legislative interference, than can be obtained from an investment in government bonds or other perfectly safe security. The man that invested in gas stock in 1823 had a right to look for and obtain, if possible, a much greater rate upon his investment than he who invested in such property in the city of New York years after the risk and danger involved had been almost entirely eliminated.

"In an investment in a gas company, such as complainant's, the risk is reduced almost to a minimum.

* * * * * * *

The court below regarded it as the most favorably situated gas business in America, and added that all gas business is inherently subject to many of the vicissitudes of manufacturing. Under the circumstances, the court held that a rate which would permit a return of 6 per cent would be enough to avoid the charge of confiscation, and for the reason that a return of such an amount was the return ordinarily sought and obtained on investments of that degree of safety in the city of New York.

"Taking all facts into consideration, we concur with the court below on this question, and think complainant is entitled to 6 per cent on the fair value of its property devoted to the public use." (29 Sup. Ct. Rep. 192.)

In a decision made public in March, 1910, by the Massachusetts Gas and Electric Light Commission, the Board issued an important statement of its attitude regarding the practice of providing for extensions and improvements of a relatively costly character out of income, instead of issuing new securities for this purpose. The decision sustained the Beverly Gas and Electric Company's rates for both gas and electricity against an appeal of consumers which has been pending for over a year, but discussed the company's

financing of extensions and improvements in the following language:

"Of the gross expenditure of the company, under its present management, for new construction, more than one third, or upwards of $180,000, has been obtained from earnings, and a large part of this in the more recent years. These figures indicate that, notwithstanding the numerous and fairly frequent reduction in price made by the company, the profits, in excess of dividends, which have been used to extend and improve its plant have been larger than can readily be justified in view of the duty which the company owes the public. In the early days of public service corporations such a policy was very general and justified by the belief that, as the capital charge was kept low and the amount per unit required for dividends decreased, low prices might be more certainly and quickly attained. If, however, the claim now made by some companies is to be conceded, and the same return is to be allowed upon the value of all property employed for the public convenience from whatever source derived, no benefit accrues to the public from such accumulation. If the claim can be successfully made, it amounts in effect, if not in form, to a stock dividend. Nor is such a claim necessary to insure a continuance of the commercial prosperity of companies of this class.

"The public has a substantial interest in what remains of the net earnings above a fair dividend. No corporate interest properly viewed requires that such a surplus be distributed to the stockholders or so invested as to impose new burdens upon consumers. A public service corporation exercising a virtual monopoly is bound to give its customers the best possible service at the lowest reasonable price, nor is the discharge of this duty to be measured merely by a comparison with the service and price prevailing elsewhere. After a payment of reasonable operating expenses, proper allowance for depreciation and emergencies, and a fair return upon the investment, surplus earnings should be used to facilitate further reductions in price. The Board is convinced that this company no longer needs to continue, as heretofore, to provide capital for extensions out of income. As soon as the combined effect of the recent reductions (which were voluntary — Eds.) and the necessary prospective expenditure and changes shall be realized, if profits shall then exceed dividends, as in some former years, it will be the plain duty of the management to make a further revision of existing rates."

Where the public utility is not controlled by a commission, that is, when the commission has no say as to rates except on complaint of the public, as much surplus may be added as the rates will produce, but in few if in any cases does the law under

which a commission works permit of capitalizing this surplus by paying stock dividends or by other means.

A private corporation depending for its trade and profits on ordinary business competition may act as it sees fit regarding capitalization; in all states but Massachusetts it may issue stock for anything that it may consider of sufficient value; in general it may pay stock dividends, thus capitalizing its surplus, and as long as it does not enter into combinations in restraint of trade, in many ways may conduct itself with much more freedom than can a public utilities corporation. With any corporation, though, it must always be a question of policy whether stock dividends should be paid. This really means a *reinvestment* of money in the *existing* property of the company, for if the surplus should be paid to each stockholder in cash, there could be no objection at all to his investing it where he pleased, and if he thought the best place for such investment would be in a corporation in which he had seen the profits grow, who could object; but in a public utilities corporation this reinvestment must be exclusively for extensions. But the trade or public might refuse to pay prices high enough to enable him to get a dividend on this extra investment, in which case it would seem to be better policy for him to let the surplus stand and by using it in the business make increased dividends on the regular stock values. Probably the "Chemical Bank" of New York City is one of the best instances of letting the original capitalization stand, for before its reorganization on a new basis its original par stock sold as high as $4800 or more, and the dividends on this original stock produced only 2½ per cent on this value. Other instances are among the stocks of the older writing paper companies, organized more than 50 years since, which before merging with other companies had a market value of upwards of $35,000 per share.

About the only reason that can be given for issuing dividend stock is that there may be more for manipulation, for the amount of earnings available for dividends could be no larger, and when paid on the new valuation or rather on the original stock with the added number of shares due to the stock dividend would naturally produce a smaller rate.

The question of issuing bonds for the cost of physical property and stock for a bonus is too large to be discussed here at any length. It may be said, however, that when any value accrues to the stock it must be obvious that it comes from an overcharge

to consumers: if the consumer can stand it or does stand the overcharge even in the face of strong competition, then such value is given simply for greater ability or better conditions. In the past Massachusetts is the only state in which it has been impossible to issue stock in this manner.

Following are a few abstracts from court decisions, and opinions of prominent writers.

"Counsel for the company urge rather faintly that the capitalization of the company ought to have some influence in the case in determining the valuation of the property. It is a sufficient answer to this contention that the capitalization is shown to be considerably in excess of any valuation testified to by any witness, or which can be arrived at by any process of reasoning. The cause for the large variation between the real value of the property and the capitalization in bonds and preferred and common stock is apparent from the testimony. All, or substantially all, the preferred and common stock was issued to contractors for the construction of the plant, and the nominal amount of the stock issued was greatly in excess of the true value of the property furnished by the contracts. Bonds and preferred and common stock issued under such conditions afford neither measure of, nor guide to the value of the property." (Knoxville Water Co. Case, 29 Sup. Ct. 151.)

"If a railroad company has bonded its property for an amount that exceeds its fair value, or if its capitalization is largely fictitious, it may not impose upon the public the burden of increased rates necessary to realize profits on this fictitious capitalization; but the basis of all calculations as to the reasonableness of rates must be the fair value of the property used by the company for the convenience of the public. In ascertaining the value, the original cost of construction, the amount expended in permanent improvements, the amount and market value of its bonds and stock, the present as compared with the original cost of construction, the probable earning capacity of the property under particular rates prescribed by statute, and the sum required to meet operating expenses, are all matters for consideration, and are to be given such weight as may be just and right in each case." (Smith *v.* Ames, 18 Sup. Ct. 418.)

"There is considerable diversity of opinion as regards the proper treatment of discount on securities sold. There is a distinction between bonds representing corporate indebtedness and having a definite limitation as to the time of their redemption, and share capital, representing ownership and which as a rule is irredeemable. In relation to the former, there can be but one tenable view. If a company

can market its 50-year 4 per cent bonds at 90 per cent of par, it means that the company's credit is on a $4\frac{1}{2}$ per cent basis; that it could market a like security paying $4\frac{1}{2}$ per cent at par. If it elects to issue at the lower rate it is merely sacrificing principal for the sake of a reduction in the annual interest charge; in other words, it is prepaying interest which would accrue during the life of the issue. If $10,000,000 par value were issued at 90 per cent, the discount would amount to $1,000,000, and the saving in interest to $50,000 per year, or $2,500,000 in 50 years. Obviously the company cannot claim the privilege of capitalizing the discount, while thereby availing itself of the reduction in interest. If such a course were legitimate in the case of a 5 or 10 per cent discount, it would be equally so if the discount were 50 or 75 per cent, when the absurdity of the proposition would be perfectly apparent. The somewhat general practice of prorating the discount, as a charge against revenues, over the term of the obligation's existence is sound; but this should be done, not in equal installments, but on the basis of the appreciated value of the bond as it approaches par at maturity. There is no apparent objection to charging discount of this nature in a lump sum against an accumulated surplus. The capitalization of discount on stocks, involving as it does the introduction of fictitious values in capital assets, is wholly indefensible." ("The Valuation of Railroads," *Railroad Age Gazette*, Jan. 22, 1909.)

Everett W. Burdett, in case of Worcester Electric Company, before the Massachusetts Gas and Electric Light Commission, says:

"It is contended by some that a Public Service Corporation has no right to receive a profit on property acquired by surplus earnings. But a company can put its surplus into stocks and bonds of other corporations and enjoy the proceeds. The Massachusetts Gas and Electric Light Commission have ruled that what a company has earned and saved is the property of the company. A Beverly company used $180,000 surplus in addition and extensions, and this was one third of all the expenditures of the year, but it did not influence the board to grant a petition for a reduction in prices. The Interstate Commerce Commission was referred to as insisting upon a surplus fund. In the case of the Chicago, Burlington and Quincy Railroad more than half the property was created out of the surplus, and the Interstate Commerce Commission affirmed the right of a railroad company to enjoy a return upon its surplus. The Pennsylvania Railroad Company reinvested two thirds of the amount of the cost of its road east of Pittsburgh, a sum amounting to $262,000,000, accumulated in twenty years. The Public Service Commission of the First District of New York in one case designated twenty years as the life of an electric light plant. The Wisconsin Railroad Commission

allowed 25 per cent as the junk value of a steam plant. In the present case the company sets 3.92 per cent as the average annual rate of depreciation, equivalent to 5.24 per cent of present value.

"In the matter of interest on investment the Wisconsin Railroad Commission, in the Menomonie case, 1909, held that 7 per cent on cost of reproduction *new* was a fair return. In the Madison case, 1910, it was held that 8 per cent was fair. Here distinction was made between interest and profit. Six per cent was for interest, 2 per cent for profit. Mayor Logan in previous testimony conceded that 6 per cent was a reasonable return.

"Large profits do not indicate high rates. Here a conservative management has resulted in successful operation. The company pays its president only $2500 per annum."

In closing this chapter the following excerpt from the decree of the Supreme Court on the Knoxville Water Case seems very apt:

"Regulation of public service corporations, which perform their duties under conditions of necessary monopoly, will occur with greater and greater frequency as time goes on. It is a delicate and dangerous function, and ought to be exercised with a keen sense of justice on the part of the regulating body, met by a frank disclosure on the part of the company to be regulated. The courts ought not to bear the whole burden of saving property from confiscation, though they will not be found wanting where the proof is clear. The legislatures and subordinate bodies, to whom the legislative power has been delegated, ought to do their part. Our social system rests largely upon the sanctity of private property; and that state or community which seeks to invade it will soon discover the error in the disaster which follows. The slight gain to the consumer, which he would obtain from a reduction in the rates charged by public service corporations, is as nothing compared with his share in the ruin which would be brought about by denying to private property its just reward, thus unsettling values and destroying confidence. On the other hand, the companies to be regulated will find it to their lasting interest to furnish freely the information upon which a just regulation can be based." (29 Sup. Ct. Rep. 148.)

CHAPTER XIV

CONTROL OF PUBLIC UTILITIES

The method of controlling all the public utilities of a state or municipality has changed considerably in the last few years, such control having been put into the hands of commissions established for the purpose in several of the states of the Union. It is a well-known fact that Massachusetts has handled public utilities in this way for some forty odd years, and most of the commissions that have been established have been founded upon principles originated by the government of that Commonwealth, but in most cases with many added powers. Commissions have been established in the following named states and in the Province of Quebec.

LIST OF STATE PUBLIC SERVICE COMMISSIONS*

State	Title	Year Created	Address
Massachusetts . .	Railroad Commission	1869	Boston
	Gas & Electric Light Commission	1885	Boston
	Highway Commission	1906 [1]	Boston
New York . . .	Public Service Commission, First Dist.	June 6, 1907	New York City
	Public Service Commission, Second Dist.	June 6, 1907	Albany
Wisconsin . . .	Railroad Commission	July 9, 1907 [2]	Madison
Oklahoma . . .	Corporation Commission	July 16, 1907 [3]	Guthrie
Georgia	Railroad Commission	Aug. 22, 1907 [4]	Atlanta
Vermont	Public Service Commission	1908	Newport
Maryland . . .	Public Service Commission	1910	Baltimore
New Jersey . . .	Board of Public Utility Commissioners	1910	Trenton
Connecticut . .	Public Utilities Commission	1911	Hartford
Kansas	Public Utilities Commission	1911	Topeka
New Hampshire .	Public Service Commission	1911	Concord
Ohio	Public Service Commission	1911	Columbus
Washington . .	Public Service Commission	1911	Olympia
Nevada	Public Utilities Commission	1911	
California . . .	Public Utilities Commission	1911	Sacramento
Province of Quebec	Public Utilities Commission	1909	Quebec

[1] The Highway Commission was established in 1893. Its supervision over telegraph and telephone companies dates from 1906.

[2] The Railroad Commission was created in 1905, but the act giving the commission control over public utilities was passed in 1907.

[3] The Oklahoma Corporation Commission was created by the first state constitution which was adopted July 16, 1907, ratified Sept. 17, 1907, and the state was admitted to the Union Nov. 16, 1907.

[4] The Georgia Railroad Commission was established in 1879, but the act extending its control to other public service corporations was passed in 1907.

* Railroad Commissions controlling Common Carriers only are not listed.

Commissions also have been established in the following named cities:

LIST OF CITY PUBLIC SERVICE COMMISSIONS

City	Title	Year Created
Kansas City, Mo.	Public Utilities Commission	1908
Seattle	Superintendent of Public Utilities	1908
Los Angeles	Board of Public Utilities	1909
St. Joseph, Mo.	Public Utilities Commission	1909
St. Louis	Public Service Commission	1909
Houston, Texas	Public Service Commissioner	1911
Wilmington, Del.	Board of Public Utility Commissioners	1911

In New York State, so vast are the properties coming under the control of these commissions that two districts have been established, one, the Public Service Commission of the First District, having charge of all public utilities in Greater New York, covering railroads, street railways, electric light companies, gas companies, telegraph companies, telephone companies, and express companies, and the Public Service Commission of the Second District, having in charge all similar public utilities over all the state outside of Greater New York.

The following statement of the powers of the Public Service Commission of New York, First District, is abstracted from an article on "The Fruits of Public Regulation in New York," published in the January, 1911, number of the Annals of the American Academy of Political and Social Science, by Honorable Milo R. Maltbie, a member of that commission.

Powers and Duties

"1. To examine into the general condition, capitalization, franchises and management of public service corporations; to compel the production of all records, documents and papers, and to summon witnesses.

"2. To establish a uniform system of accounts and records and prescribe the form of annual, quarterly and monthly reports.

"3. To order repairs or changes in corporate property, the use of additional facilities, or the adoption of improved methods of operation, in order to secure safe and adequate service.

"4. To test gas and electric meters, approve types of meters, and establish standards of quality for gas and electric service.

"5. To fix just and reasonable rates to be charged by public service corporations, to prevent unjust discrimination, and to require two or more carriers to establish through routes and fix joint rates for through service.

"6. To entertain complaints and after due hearing make such order as will remove the cause of complaint.

"7. To grant or withhold the certificate needed by a public service corporation before it can begin new construction or exercise a franchise or right not already exercised.

"8. To approve or disapprove the transfer of a franchise, or the making of a contract relating to a franchise.

"9. To give or withhold permission for the issuing of corporate securities, or for the merger of existing companies; but not to permit the capitalization of any merger or franchise itself.

"10. To grant or refuse permission for the transfer of stock in a public service corporation to a similar corporation, or for the acquisition of more than ten per cent of such stock by any corporation.

"11. To grant, subject to the approval of the Board of Estimate and Apportionment, franchises for rapid transit railroads, whether subways, tunnels, elevated roads or continuations of trunk lines, such as the recent Pennsylvania Railroad extensions.

"12. Subject to the approval of the same board, to lay out municipal rapid transit routes, prepare plans, obtain contractors, supervise construction, and secure operators for such routes, or under certain conditions to operate them directly.

"All freight and passenger tariffs, including joint tariffs and the names of participating carriers, and all contracts or arrangements relating to transportation, must be filed with the Commission. The Commission has also required the rate schedules of all gas and electric companies to be filed."

Farther on in his article Mr. Maltbie has the following to say regarding capitalization:

"(1) The capitalization of franchises will not be allowed, directly or indirectly, except so far as permitted by statute.

"(2) Overcapitalization leads to inferior service and unwarranted exactions. The people of New York have too vivid evidence upon this point to forget its importance.

"(3) The mere fact of investment does not establish a perpetual value not only because a mistake in judgment may be made, but also because property may be allowed to deteriorate, because progress in the arts may make it obsolete, and because a change in economic conditions may decrease the use made of it by the public. It is a well known fact, and was stated in evidence, that the physical property of the Third Avenue system was allowed to fall into disrepair. Certain lines are still operated by horses, certainly an obsolete method of transportation. Other lines have ceased to be of value, and their operation has practically been abandoned. To assert that because a company at one

time put money into property which has become useless, wornout and obsolete, a successor company which purchases that property at foreclosure sale should be allowed to capitalize for the amount originally expended is so absurd as not to require further discussion. Investment may be evidence of the good intentions of the investor, but it is not an infallible standard of perpetual value. *The Commission believes the proposition to be sound that capitalization should have a direct relation to value.*

"(4) The present value of the property, as shown by a careful appraisal, allowance being made for contractor's profit, engineering, administration, development expenses and other legitimate expenses, was several million dollars below the proposed capitalization. In arriving at this conclusion, the Commission adopted the principles (*a*) that the present value of property is not determined by the original cost, (*b*) that allowance must be made for appreciation and depreciation, (*c*) that its actual condition, its age, its adequacy, its fitness to the needs of the community are most important and fundamental considerations, (*d*) that property that has ceased to exist, although originally a legitimate charge to capital, should not be capitalized in perpetuity, and (*e*) that charges for maintenance, replacements and supercessions are prior claims to dividends.

"(5) The net earnings for any single year or series of years are not a proper basis for determining the capitalization of a company, particularly when the rates charged for the service rendered may be regulated by the state. An ordinary business corporation fixes its own charges; it is not subject to state regulation; but a public service corporation does not have such privilege. The fundamental factor in rate regulation is a fair return upon the value of the property. Hence, if a company issued stocks and bonds upon the basis of earnings for a given year or period, and if it were found that the rates then charged were too high and were reduced by the state, resulting in the reduction also of net earnings, the capitalization once justified by earnings would be no longer proper. This is illogical and unsound.

"(6) The amount of capital represented by bonds should not be in excess of the amount upon which there is definite certainty that interest may be earned. It would obviously be unwise and useless to approve a plan which might easily mean another foreclosure and reorganization in a few years. This is the second time within ten years that the Third Avenue Company has been in the hands of a receiver. It is time that a conservative plan were adopted, and upon such sound principles that another cataclysm will not be necessary.

"(7) The applicants admitted that the present earnings were not sufficient to pay interest and dividends upon the proposed issues, and the Commission found that the prospective earnings were so uncertain that approval should not be given."

One of the most important powers conferred upon commissions of this kind is that of passing upon the securities of the public utilities corporations. I quote as follows from the article by Mr. Maltbie:

> "Every application is subjected to a searching investigation into the condition of the company's finances, and often an appraisal of its physical property has been made. The purposes for which the securities are to be issued are carefully scrutinized to see that no charges are made to capital that should go to operating expenses.
>
> "The order of approval states the purposes for which the money may be expended, the rate at which the securities may be issued, the period within which any discounts, commissions and expenses of the issue shall be repaid and often the method of amortization. It usually provides also for periodic reports to the Commission, the audit of the accounts by employees of the Commission and public sale to the highest bidder, unless a certain price is realized at private sale."

CHAPTER XV

COURT DECISIONS

Consolidated Gas Co. Case

William R. Willcox, et al., Constituting the Public Service Commission, etc., of New York, Appts., *v.* Consolidated Gas Co. of New York. (No. 396.)

City of New York, Appt., *v.* Consolidated Gas Co. of New York. (No. 397.)

William S. Jackson, as Attorney General of the State of New York, Appt., *v.* Consolidated Gas Co. of New York. (No. 398.)

(29 Sup. Ct. Rep. 192.)

Syllabus.

Courts — Federal Courts — Jurisdiction — Enjoining Enforcement of Gas Rates

1. A Federal circuit court, if properly appealed to, cannot decline, on the ground of discretion or comity, to take jurisdiction of a suit to enjoin the enforcement of state statutes fixing gas rates which are asserted to violate the Federal Constitution.

Gas — Rates — Legislative Regulation — Reasonableness

2. Legislative regulation of gas rates is invalid, where such rates are plainly unreasonable to the extent that their enforcement will be equivalent to the taking of property for public use without such compensation as, under the circumstances, is just, both to the owner and the public. There must be a fair return upon the reasonable value of the property at the time it is being used for the public.

Gas — Rates — Enjoining Enforcement

3. The case must be a clear one before the courts should be asked to interfere by injunction with state legislation regulating gas rates, in advance of any actual experience of the practical result of such rates.

Gas — Rates — Legislative Regulation — Reasonableness — Franchise Valuation

4. The valuation of the franchises of the constituent gas companies as fixed by them when organizing a consolidated corporation pursuant to New York Laws, 1884, chap. 367, which valuation was included in the total sum for which the consolidated corporation issued its stock, must be accepted by the courts in testing the reasonableness of legislative regulation of gas rates as conclusive of such value at the time of consolidation, where the validity of the agreement fixing the valuation has always been recognized, and the stock has earned large dividends and has been largely dealt in for many years on the basis of the validity of the valuation and of the stock.

Gas — Rates — Legislative Regulation — Reasonableness — Increase in Franchise Valuation

5. Increase since consolidation of the tangible assets of a consolidated gas company and in the amount of gas supplied by it does not justify the court, when testing the reasonableness of the rates fixed by statute, in attributing a proportional increase to the value of the franchises as fixed by the constituent companies at the time of consolidation.

Gas — Rates — Legislative Regulation — Reasonableness — Income

6. There is no particular rate of compensation which any corporation subject to legislative control respecting rates has the right to obtain without legislative interference.

Gas — Rates — Legislative Regulation — Reasonableness — Income

7. Gas rates which will yield to a corporation having a monopoly of the gas service in New York City a return of 6 per cent upon the fair value of the property actually used by such company in its business are not confiscatory.

Gas — Rates — Enjoining Enforcement

8. A court of equity ought not to interfere by injunction with state legislation fixing gas rates before a fair trial has been made of continuing the business under such rates, where the rates com-

plained of show a very narrow line of division between possible confiscation and proper regulation, as based upon the findings as to the value of the property, and the division depends upon variant opinions as to value and upon the results in the future of operating under such rates.

Gas — Rates — Legislative Regulation — Reasonableness — Franchise Valuation

9. The assessed value for taxation of the franchises of a gas company furnishes no criterion by which to ascertain their value, when testing the reasonableness of gas rates as fixed by statute, where the taxes are treated by the company as part of its operating expenses, to be paid out of its earnings before the net amount applicable to dividends can be ascertained.

Gas — Rates — Legislative Regulation — Reasonableness — Value of Good Will

10. No allowance for the value of the good will should be made in estimating the value of the property of a gas company upon which it is entitled to earn a fair return, for the purpose of testing the reasonableness of the rates fixed by statute, where such company is secure from possible competition.

Gas — Rates — Legislative Regulation — Reasonableness — Valuation

11. The valuation of the property of a gas company, upon which it is entitled to a fair return, must, as a general rule, be determined as of the time when the inquiry is made regarding the reasonableness of rates fixed by statute, giving the company the benefit of any increase in the value of the property since it was acquired.

Gas — Legislative Regulation of Pressure

12. The requirements as to gas pressure made by New York Laws, 1905, chap. 756, and Laws, 1906, chap. 125, fixing gas rates in New York City, are confiscatory, where, to put this pressure upon the mains and other service pipes, in their present condition, is to run a great risk of explosion and consequent disaster, and to eliminate such danger requires an expenditure of many millions of dollars, from which no return can be had at the rates established by those acts.

STATUTES — PARTIAL INVALIDITY

13. The invalidity of the provisions as to gas pressure and penalties contained in New York Laws, 1905, chap. 736, and Laws, 1906, chap. 125, regulating gas rates in New York City, does not invalidate the provisions of those acts respecting rates, from which the invalid provisions are clearly separable.

GAS — RATES — LEGISLATIVE REGULATION — REASONABLENESS — DISCRIMINATION

14. A discrimination between the individual consumer and the city in the provisions of New York Laws, 1905, chap. 736 and Laws, 1906, chap. 125, fixing gas rates in New York City, is not material to the inquiry as to the reasonableness of such rates if the total profits from the gas supplied to all consumers is sufficient to insure the requisite return upon the property used by the gas company in its business.

DISMISSAL AND NONSUIT — DISMISSAL WITHOUT PREJUDICE

15. The dismissal of a bill which seeks to enjoin the enforcement of legislative regulation of gas rates as confiscatory in advance of any actual experience of the practical result of such rates should be without prejudice, where such practical experience may prevent the complainant from obtaining a fair return upon the property used by it in its business.

[Nos. 396, 397, 398.]

Argued November 4, 5, 6, 1908. Decided January 4, 1909.

Appeals from the circuit court of the United States for the southern district of New York to review a decree enjoining the enforcement of legislative regulation of gas rates. Reversed with directions to dismiss the bill without prejudice.

See same case below, 157 Fed. 849.

Statement by Mr. Justice Peckham:

"The appellee, complainant below, filed its bill May 1, 1906, in the United States circuit court for the southern district of New York, against the city of New York, the attorney general of the state, the district attorney of New York county, and the gas commission of the state, to enjoin the enforcement of certain acts of the legislature of

the state, as well as of an order made by the gas commission, February 23, 1906, to take effect May 1, 1906, relative to rates for gas in New York City.

"Since the commencement of the suit, the gas commission has been abolished and the public service commission has been created by the legislature in its stead. The official term of Attorney General Meyer has also expired, and Attorney General Jackson, his successor, has been substituted in his place.

"The ground for the relief asked for in the bill was the alleged unconstitutionality of the acts and the order, because the rates fixed were so low as to be confiscatory. Upon filing the bill a preliminary injunction was granted (146 Fed. 150), and, after issue was joined, the case was referred to one of the standing masters of the court to take testimony, in conformity to the practice indicated in Chicago, M. &. St. P. R. Co. *v.* Tompkins, 176 U.S. 167, 179, 44 L. ed. 417, 422, 20 Sup. Ct. Rep. 336.

"A hearing was had before the master, who reported in favor of the complainant. The case then came before the circuit court, and, after argument, a final decree was entered, restraining defendants from enforcing the provisions of the acts and the order relating to rates or penalties. 157 Fed. 849. These various defendants, except the district attorney, have taken separate appeals directly to this court from the decree so entered. The acts which are declared void as unconstitutional are chapter 736 of the Laws of 1905, which limits the price of gas sold to the city of New York to a sum not to exceed 75 cents per thousand cubic feet. The fact also requires that the gas sold shall have a specified illuminating power, and a certain pressure at all distances from the place of manufacture. Penalties are attached to a violation of the act. The other act is chapter 125 of the Laws of 1906, limiting the prices of gas in the boroughs of Manhattan and the Bronx, to other consumers than the city of New York, to 80 cents per thousand cubic feet, with like penalties as in the act of 1905, and with the same provisions as to illuminating power and the pressure in the service mains. The order which was declared invalid was one made by the gas commission created under and by virtue of chapter 737 of the Laws of 1905, the order providing that the price of gas in the city should be not more than 80 cents to consumers other than the city of New York. The order had the same provisions as to illuminating power and pressure as the acts above mentioned. The master and the court below found that the 80-cent rate was so low as to amount to confiscation, and hence the acts and the order were invalid as in violation of the Federal Constitution."

Messrs. Edward B. Whitney and George S. Coleman for the Public Service Commission.

Messrs. Alton B. Parker, William P. Burr, and Francis K. Pendleton for the city of New York.

Mr. William S. Jackson *in propria persona* for the Attorney General.

Messrs. James M. Beck, John A. Garver, Charles F. Mathewson, and Shearman & Sterling for the Consolidated Gas Company.

Messrs. W. Bourke Cockran and Nathan Matthews as *amici curiæ*.

Mr. Justice Peckham, after making the foregoing statement, delivered the opinion of the court:

> "At the outset it seems to us proper to notice the views regarding the action of the court below, which have been stated by counsel for the appellants, the public service commission, in their brief in this court. They assume to criticize that court for taking jurisdiction of this case, as precipitate, as if it were a question of discretion or comity, whether or not that court should have heard the case. On the contrary, there was no discretion or comity about it. When a Federal court is properly appealed to in a case over which it has by law jurisdiction, it is its duty to take such jurisdiction (Cohen *v.* Virginia, 6 Wheat, 264, 404, 5 L. ed. 257, 291), and, in taking it, that court cannot be truthfully spoken of as precipitate in its conduct. That the case may be one of local interest only is entirely immaterial, so long as the parties are citizens of different states or a question is involved which, by law, brings the case within the jurisdiction of a Federal court. The right of a party plaintiff to choose a Federal court where there is a choice, cannot be properly denied. Re Metropolitan R. Receivership, 208 U.S. 90–110, 52 L. ed. 403–412, 28 Sup. Ct. Rep. 219; Prentis *v.* Atlantic Coast Line R. Co. 211 U.S. 210, ante, 67, 29 Sup. Ct. Rep. 67. In the latter case it was said that a plaintiff could not be forbidden to try the facts upon which his right to relief is based before a court of his own choice, if otherwise competent. It is true an application for an injunction was denied in that case because the plaintiff should, in our opinion, have taken the appeal allowed him by the law of Virginia, while the rate of fare in litigation was still at the legislative stage, so as to make it absolutely certain that the officials of the state would try to establish and enforce an unconstitutional rule.
>
> "The case before us is not like that. It involves the constitutionality, with reference to the Federal Constitution, of two acts of the legislature of New York, and it is one over which the circuit court undoubtedly had jurisdiction under the act of Congress, and its action in taking and hearing the case cannot be the subject of proper criticism.
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> "An examination of the record herein, with reference to the questions involved in the merits, shows that the act under which the gas com-

mission was appointed was, subsequently to the commencement and trial of this suit, declared, on grounds not here material, to be unconstitutional by the court of appeals of New York. Saratoga Springs *v.* Saratoga Gas, Electric Light, & P. Co., 191 N. Y. 123, 83 N. E. 693, February 18, 1908. The order made by the commission must therefore be regarded as invalid. It is not important in this case, because the act of the legislature of 1906 makes the same provision as to the price of gas to consumers other than the city that the order does. We have, as remaining to be considered, the above mentioned two acts of the legislature.

"The question arising is as to the validity of the acts limiting the rates for gas to the prices therein stated. The rule by which to determine the question is pretty well established in this court. The rates must be plainly unreasonable to the extent that their enforcement would be equivalent to the taking of property for public use without such compensation as, under the circumstances, is just both to the owner and the public. There must be a fair return upon the reasonable value of the property at the time it is being used for the public. San Diego Land & Town Co. *v.* National City, 174 U.S. 739, 757, 43 L. ed. 1154, 1161, 19 Sup. Ct. Rep. 804; San Diego Land & Town Co. *v.* Jasper, 189 U.S. 439, 442, 47 L. ed. 892, 894, 23 Sup. Ct. Rep. 571.

"Many of the cases are cited in Knoxville *v.* Knoxville Water Co. just decided. [211 U.S. — , ante, 148, 29 Sup. Ct. Rep. 148.] The case must be a clear one before the courts ought to be asked to interfere with state legislation upon the subject of rates, especially before there has been any actual experience of the practical result of such rates. In this case the rates have not been enforced as yet, because the bill herein was filed, and an injunction obtained restraining their enforcement, before they came into actual operation.

"In order to determine the rate of return upon the reasonable value of the property at the time it is being used for the public, it, of course, becomes necessary to ascertain what that value is. A very great amount of evidence was taken before the master upon that subject, which is included in five large volumes of the record. Valuations by expert witnesses were given as to the value of the real estate owned by the complainant, and as to the value of the mains, service pipes, plants, meters, and miscellaneous personal property.

"The value of real estate and plant is, to a considerable extent, matter of opinion; and the same may be said of personal estate when not based upon the actual cost of material and construction. Deterioration of the value of the plant, mains, and pipes is also, to some extent, based upon opinion. All these matters make questions of value somewhat uncertain; while added to this is an alleged prospective loss of income from a reduced rate, — a matter also of much uncertainty, depending upon the extent of the reduction and the probable increased

consumption, — and we have a problem as to the character of a rate which is difficult to answer without a practical test from actual operation of the rate. Of course, there may be cases where the rate is so low, upon any reasonable basis of valuation, that there can be no just doubt as to its confiscatory nature; and, in that event, there should be no hesitation in so deciding and in enjoining its enforcement without waiting for the damage which must inevitably accompany the operation of the business under the objectionable rate. But, where the rate complained of shows, in any event, a very narrow line of division between possible confiscation and proper regulation, as based upon the value of the property found by the court below, and the division depends upon opinions as to value, which differ considerably among the witnesses, and also upon the results in the future of operating under the rate objected to, so that the material fact of value is left in much doubt, a court of equity ought not to interfere by injunction before a fair trial has been made of continuing the business under that rate, and thus eliminating, as far as is possible, the doubt arising from opinions as opposed to facts.

"A short history of the complainant, as to its incorporation and its capital, and the method by which the value of its franchises was arrived at, will render the further examination of the case more intelligible.

"Prior to 1884 there were seven gaslight companies in New York City, each operated under separate charters, granted at different times between the years 1823 and 1865 or 1871. They each had the right to use the streets of certain portions of the city for the purpose of laying their mains and service pipes in order to furnish gas to the city and the citizens. Not one of the companies had ever been called upon to pay a penny for such right, but the grant to each was, in that aspect, a gratuity. It was not, at the time of granting franchises such as these, the custom to pay for them.

"In 1884, by chapter 367 of the laws of that year, authority to consolidate manufacturing corporations was granted upon conditions mentioned in the act. The directors of the corporations proposing to consolidate were to make an agreement for consolidation, embracing, among other things, the amount of capital and the number of shares of stock into which it should be divided, the capital not to be in amount more 'than the fair aggregate value of the property, franchises, and rights of the several companies to be consolidated.' The agreement was not to be valid until submitted to the stockholders of each of the companies and approved by two thirds of each. The constituent companies, which were afterwards consolidated under their agreement, and pursuant to the act mentioned, were six in number, the seventh, the Mutual Company, withdrawing. The companies agreed upon the valuation of their property, which was to be paid for in the stock of the con-

solidated company, and the original stock held by the stockholders of each company was surrendered to the consolidated company. The value of the franchise of all the companies was set at the figure of $7,781,000. The court below said that the master reported there was little direct evidence before him as to the value of the franchises, to which the court added that if the master, by direct evidence, meant testimony of the same kind regarding their value as had been offered regarding every item of tangible property, there was none at all.

"The court further stated that it does not appear in the evidence how the valuation of the franchises was measured, or why the figures selected were chosen, but that it was true, that when complainant was organized, in 1884, under the consolidation statute, which, in terms, permitted it to acquire the property and franchises of the other companies, it issued stock of the par value of $7,781,000, representing the franchises it then acquired and nothing else, and that the stock was held by purchasers who, I am compelled to think, had a right to rely upon legal protection for legally issued stock. It is not, of course, contended there was special stock issued for this particular item, but it was included in the total sum for which the consolidated company issued its stock, and, upon its receipt, the stockholders in the various companies surrendered their stock in those companies. The result was that the amount of the stock issued by the consolidated company was increased by $7,781,000, representing a value of franchises which was agreed upon by the stockholders in the companies, and which had never cost any of them a single penny.

"It cannot be disputed that franchises of this nature are property and cannot be taken or used by others without compensation. Monongahela Navigation Co. *v.* United States, 148 U. S. 312, 37. L. ed. 463, 13 Sup. Ct. Rep. 622; People *v.* O'Brien, 111 N. Y. 1, 2 L. R. A. 255, 7 Am. St. Rep. 684, 18 N. E. 692, and cases cited. The important question is always one of value. Taking their value in this case as arrived at by agreement of their owners, at the time of the consolidation, that value has been increased by the finding of the court below to the sum of $12,000,000 at the time of the commencement of this suit. The trial court said: 'If, however, complainant's franchises were worth $7,781,000 in 1884, and its tangible property, at the same time, was appraised (as appears in evidence) at $30,000,000 (in round figures), then since complainant's business (in sales volume) has, in twenty-three years, almost quadrupled, and its tangible assets grown to $47,000,000, it appears to me that a fair method of fixing value of the franchises in 1905 is to assume the same growth in value for the franchise as is demonstrated by the evidence in the case of tangible property. If, therefore, the franchise valuation of 1884 was proportioned to personalty and realty of $30,000,000, a franchise valuation proportioned to $47,000,000 in 1905 would be over $12,000,000. This, I think, a

logical result from the assumption I am compelled to start with, *i.e.* that franchises have a separable and independent value. But there is, however, no method of valuing franchises, except by a consideration of earnings. Earnings must be proportioned to assets; and both kinds of assets, tangible and intangible, must stand upon the same plane of valuation. Having, therefore, a measure of growth of tangible assets from 1884 to 1905, the franchise assets must be assumed to have grown in the same proportion. I find that the value of complainant's franchises at the date of inquiry was not less than $12,000,000, making a total valuation of $59,000,000, upon which the probable return is $3,030,000, or very considerably less than 6 per cent.' The judge stated his own views as opposed to including these franchises in the property upon the value of which a return is to be calculated in fixing the amount of rates, but held that he was bound by decided cases to hold against his personal views.

"We are not prepared to hold with the court below as to the increased value which it attributes to the franchises. It is not only too much a matter of pure speculation, but we think it is also opposed to the principle upon which such valuation should be made. This corporation is one of that class which is subject to regulation by the legislature in the matter of rates, provided they are not made so low as to be confiscatory. The franchises granted the various companies and held by complainant consisted in the right to open the streets of the city and lay down mains and use them to supply gas, subject to the legislative right to so regulate the price for the gas as to permit not more than a fair return (regard being had to the risk of the business), upon the reasonable value of the property at the time it is being used for the public.

"The evidence shows that from their creation, down to the consolidation in 1884, these companies had been free from legislative regulation upon the amount of the rates to be charged for gas. They had been most prosperous and had divided very large earnings in the shape of dividends to their stockholders, — dividends which are characterized by the Senate committee, appointed in 1885 to investigate the fact surrounding the consolidation, as enormous. The report of that committee shows that several of the companies had averaged, from their creation, dividends over 16 per cent, and the six companies in the year 1884 paid a dividend upon capital which had been increased by earnings, as in the case of the Manhattan and the New York, of 18 per cent; and, had it been upon the money actually paid in, it would have been nearly 25 per cent.

"The committee also said in the same report that these 'franchises were in force November 10,1884, the time of the consolidation, and the money invested in them was earning the same enormous dividends. So far as the evidence shows, there was nothing in the condition of

affairs on the 10th of November to indicate that these franchises would not be as valuable for the next twenty years as they had been in the past. There were gas companies enough in the city with a capacity capable of supplying the demands for the next twenty years. A law was on our statute books that virtually prohibited the laying of any more gas pipes in the streets. The gas companies had an agreement among themselves, fixing the price of gas at a figure that paid these dividends. The people were paying this price, as they had in the past, without objection or protest. This price may have been too high, and the dividends were excessive, but they were not illegal, and the valuation of the franchises computed upon these dividends and that state of facts cannot be called a violation of a law that expressly authorized it to be done, unless such valuation was too high.'

"The committee, upon these facts, were of opinion that the valuation of $7,781,000 for the franchises was not more than their fair aggregate value.

"Assuming, as the committee did, that the company would be permitted to charge the same prices in the future which in the past had resulted in these 'enormous' or 'excessive' dividends, it need not be matter of surprise that a franchise by means of which such dividends had been possible was not regarded as overvalued at the sum stated in 1884.

"We think that, under the above facts, the courts ought to accept the valuation of the franchises fixed and agreed upon under the act of 1884 as conclusive at that time. The valuation was provided for in the act, which was followed by the companies, and the agreement regarding it has been always recognized as valid, and the stock has been largely dealt in for more than twenty years past on the basis of the validity of the valuation and of the stock issued by the company.

"But, although the state ought, for these reasons, to be bound to recognize the value agreed upon in 1884 as part of the property upon which a reasonable return can be demanded, we do not think an increase in that valuation ought to be allowed upon the theory suggested by the court below. Because the amount of gas supplied has increased to the extent stated, and the other and tangible property of the corporations has increased so largely in value, is not, as it seems to us, any reason for attributing a like proportional increase in the value of the franchise. Real estate may have increased in value very largely, as also the personal property, without any necessary increase in the value of the franchise. Its past value was founded upon the opportunity of obtaining these enormous and excessive returns upon the property of the company, without legislative interference with the price for the supply of gas; but that immunity for the future was, of course, uncertain; and the moment it ceased, and the legislature reduced the earnings to a reasonable sum, the great value of the franchise would be at once and unfavorably affected, but how much so it is not possible for us

now to see. The value would most certainly not increase. The question of the regulation of rates did, from time to time thereafter, arise in the legislature, and finally culminated in these acts which were in existence when the court below found this increased value of the franchises. We cannot, in any view of the case, concur in that finding.

"This increase in value did, however, form part of the sum upon which the court below held the complainant was entitled to a return. That court found the value of the tangible assets actually employed at the time of the commencement of this suit in the business of supplying gas by the complainant to be $47,831,435, to which it added the $12,000,000 as the value of the franchises as found by it, making the total of $59,831,435, upon which it held that the company was entitled to a return of 6 per cent, being $3,589,886.10. It also found its total net income for the year 1905 amounted to $5,881,192.45, almost 10 per cent upon the sum above named. Altering the finding of the court so far only as to place the value of the franchises at the time agreed upon in 1884, $7,781,000, the total value upon that basis of the property employed by the company would be $55,612,435, upon which 6 per cent would be $3,336,746.10, while the sum estimated as the return on 80-cent gas would have been $3,024,592.14, which is nearly 5½ per cent on the above total of $55,612,435.

"What has been said herein regarding the value of the franchises in this case has been necessarily founded upon its own peculiar facts, and the decision thereon can form no precedent in regard to the valuation of franchises generally, where the facts are not similar to those in the case before us. We simply accept the sum named as the value under the circumstances stated.

"There is no particular rate of compensation which must, in all cases and in all parts of the country, be regarded as sufficient for capital invested in business enterprises. Such compensation must depend greatly upon circumstances and locality; among other things, the amount of risk in the business is a most important factor, as well as the locality where the business is conducted, and the rate expected and usually realized there upon investments of a somewhat similar nature with regard to the risk attending them. There may be other matters which, in some cases, might also be properly taken into account in determining the rate which an investor might properly expect or hope to receive and which he would be entitled to without legislative interference. The less risk, the less right to any unusual returns upon the investments. One who invests his money in a business of a somewhat hazardous character is very properly held to have the right to a larger return, without legislative interference, than can be obtained from an investment in government bonds or other perfectly safe security. The man that invested in gas stock in 1823 had a right to look for and obtain, if possible, a much greater rate upon his investment than he who invested

in such property in the city of New York years after the risk and danger involved had been almost entirely eliminated.

"In an investment in a gas company, such as complainant's, the risk is reduced almost to a minimum. It is a corporation which, in fact, as the court below remarks, monopolizes the gas service of the largest city in America, and is secure against competition under the circumstances in which it is placed, because it is a proposition almost unthinkable that the city of New York would, for purposes of making competition, permit the streets of the city to be again torn up in order to allow the mains of another company to be laid all through them to supply gas which the present company can adequately supply. And, so far as it is given us to look into the future, it seems as certain as anything of such a nature can be, that the demand for gas will increase, and, at the reduced price, increase to a considerable extent. An interest in such a business is as near a safe and secure investment as can be imagined with regard to any private manufacturing business, although it is recognized at the same time that there is a possible element of risk, even in such a business. The court below regarded it as the most favorably situated gas business in America, and added that all gas business is inherently subject to many of the vicissitudes of manufacturing. Under the circumstances, the court held that a rate which would permit a return of 6 per cent would be enough to avoid the charge of confiscation, and for the reason that a return of such an amount was the return ordinarily sought and obtained on investments of that degree of safety in the city of New York.

"Taking all facts into consideration, we concur with the court below on this question, and think complainant is entitled to 6 per cent on the fair value of its property devoted to the public use. But, assuming that the company is entitled to 6 per cent upon the value of its property actually used for the public, the total fixed by the court below is, as we have seen, much too large. We must first strike out the increased value of the franchises asserted by the court over the amount agreed upon in 1884, when the company was consolidated. We also find that the total value of the tangible property is made up of several items, two of which are —

Real Estate	$11,985,435
Plants	$15,000,000

"Both depend largely upon the opinions of expert witnesses as to the value of that kind of property. Where a large amount of the total value of a mass of different properties consists in the value of real estate, which is only ascertained by the varying opinions of expert witnesses, and where the opinions of the plaintiffs' witnesses differ quite radically from those of the defendants, it is apparent that the total value must necessarily be more or less in doubt. It, in other words, becomes matter of speculation or conjecture to a great extent.

It may be, as already suggested, that, in many cases, the rates objected to might be so low that there could be no reasonable doubt of their inadequacy upon any fair estimate of the value of the property. In such event the enforcement of the rates should be enjoined even in a case where the value of the property depends upon the value to be assigned to real estate by the evidence of experts. But there may be other cases where the evidence as to the probable result of the rates in controversy would show they were so nearly adequate that nothing but a practical test could satisfy the doubt as to their sufficiency.

"In this case a slight reduction in the estimated value of the real estate, plants, and mains, as given by the witnesses for complainant, would give a 6 per cent return upon the total value of the property, as above stated. And again, increased consumption at the lower rate might result in increased earnings, as the cost of furnishing the gas would not increase in proportion to the increased amount of gas furnished.

"The elevated railroads in New York, when first built, charged 10 cents for each passenger; but, when the rate was reduced to 5 cents, it is common knowledge that their receipts were not cut in two, but that, from increased patronage, the earnings increased from year to year, and soon surpassed the highest sum ever received upon the 10-cent rate.

"Of course, there is always a point below which a rate could not be reduced, and, at the same time, permit the proper return on the value of the property; but it is equally true that a reduction in rates will not always reduce the net earnings, but, on the contrary, may increase them. The question of how much an increased consumption under a less rate will increase the earnings of complainant, if at all, at a cost not proportioned to the former cost, can be answered only by a practical test. In such a case as this, where the other *data* upon which the computation of the rate of return must be based are, from the evidence, so uncertain, and where the margin between possible confiscation and valid regulation is so narrow, we cannot say there is no fair or just doubt about the truth of the allegation that the rates are insufficient.

"The complainant also contends that the state, having taxed it upon its franchises, cannot be heard to deny their existence or their value as taxed.

"The fact that the state has taxed the company upon its franchises at a greater value than is awarded them here is not material. Those taxes, even if founded upon an erroneous valuation, were properly treated by the company as part of its operating expenses, to be paid out of its earnings before the net amount could be arrived at applicable to dividends, and, if such latter sums were not sufficient to permit the proper return on the property used by the company for the public, then the rate would be inadequate. The future assessment of the value

of the franchises, it is presumed, will be much lessened if it is seen that the great profits upon which that value was based are largely reduced by legislative action. In that way the consumer will be benefited by paying a reduced sum (although indirectly) for taxes.

"We are also of opinion that it is not a case for a valuation of 'good will.' The master combined the franchise value with that of good will and estimated the total value at $20,000,000.

"The complainant has a monopoly in fact, and a consumer must take gas from it or go without. He will resort to the 'old stand,' because he cannot get gas anywhere else. The court below excluded that item, and we concur in that action.

"And we concur with the court below in holding that the value of the property is to be determined as of the time when the inquiry is made regarding the rates. If the property which legally enters into the consideration of the question of rates has increased in value since it was acquired, the company is entitled to the benefit of such increase. This is, at any rate, the general rule. We do not say there may not possibly be an exception to it where the property may have increased so enormously in value as to render a rate permitting a reasonable return upon such increased value unjust to the public. How such facts should be treated is not a question now before us, as this case does not present it. We refer to the matter only for the purpose of stating that the decision herein does not prevent an inquiry into the question when, if ever, it should be necessarily presented.

"The matter of the increased cost of the gas, resulting from the provisions of the acts as to making the gas equal to twenty-two candle power, is also alleged as a reason for inadequacy of rate.

"It appears that the average candle power actually produced in the first six months of the year 1905 was twenty-two, while but twenty candle power was exacted by law, and, for the last six months of that year, while twenty-two candle power was exacted, the average amount was 24.19. This expense was included in the operating expense of that year, which resulted in the net earnings above mentioned, while the company was complying with the requirements of the act in this particular.

"It is unnecessary, therefore, to further inquire as to the additional expense caused by this requirement.

"Again, it has been asserted that the laws are unconstitutional because of the provision as to pressure, and also by reason of the penalties which a violation of the acts may render a corporation liable to.

"The acts provide that the pressure of the gas in the service mains at any distance from the place of manufacture shall not be less than 1 inch nor more than 2½ inches.

"The evidence shows that, to put a pressure such as is demanded by the acts upon the mains and other service pipes in their present condition

would be to run a great risk of explosion, and consequent disaster. Before compliance with this provision would be safe, the mains and other pipes would have to be strengthened throughout their whole extent, and at an expenditure of many millions of dollars, from which no return could be obtained at the rates provided in the acts. This would take from the complainant the ability to secure the return to which it is entitled upon its property, used for supplying gas, and the provision as to the amount of pressure is therefore void. This particular duty imposed by the acts is, however, clearly separable from the enactments as to rates, and we have no doubt that the remainder of the statute would have been enacted, even with that provision omitted.

"The obligation would remain upon the company to have a pressure sufficient to insure a light of twenty-two candle power, as provided in the acts.

"We are of the same opinion as to the penalties provided for a violation of the acts. They are not a necessary or inseparable part of the acts, without which they would not have been passed. If these provisions as to penalties have been properly construed by the court below, they are undoubtedly void, within the principle decided in Ex parte Young, 209 U. S. 123, 52 L. ed. 714, 13 L.R.A. (N.S.) 932, 28 Sup. Ct. Rep. 441, and the cases there cited, because so enormous and overwhelming in their amount.

"When the objectionable part of a statute is eliminated, if the balance is valid and capable of being carried out, and if the court can conclude it would have been enacted if that portion which is illegal had been omitted, the remainder of the statute thus treated is good. Reagan *v.* Farmers' Loan & T. Co., 154 U. S. 362, 395, 38 L. ed. 1014, 1022, 4 Inters. Com. Rep. 560, 14 Sup. Ct. Rep. 1047; Berea College *v.* Kentucky, 211 U. S. 45–54, *ante*, 33, 29 Sup. Ct. Rep. 33. This is a familiar principle.

"Lastly, it is objected that there is an illegal discrimination as between the city and the consumers individually. We see no discrimination which is illegal or for which good reasons could not be given. But neither the city nor the consumers are finding any fault with it, and the only interest of the complainant in the question is to find out whether by the reduced price to the city, the complainant is, upon the whole, unable to realize a return sufficient to comply with what it has the right to demand. What we have already said applies to the facts now in question.

"We cannot see, from the whole evidence, that the price fixed for gas supplied to the city by wholesale, so to speak, would so reduce the profits from the total of the gas supplied as to thereby render such total profits insufficient as a return upon the property used by the complainant. So long as the total is enough to furnish such return, it is not

important that, with relation to some customers, the price is not enough. Minneapolis St. L. R. Co. *v.* Minnesota, 186 U. S. 257, 46 L. ed. 1151, 22 Sup. Ct. Rep. 900; Atlantic Coast Line R. Co. *v.* North Carolina Corp. Commission, 206 U. S. 1, 51 L. ed. 933, 27 Sup. Ct. Rep. 585.

"Upon a careful consideration of the case before us we are of opinion that the complainant has failed to sustain the burden cast upon it of showing beyond any just or fair doubt that the acts of the legislature of the state of New York are in fact confiscatory.

"It may possibly be, however, that a practical experience of the effect of the acts by actual operation under them might prevent the complainant from obtaining a fair return, as already described, and, in that event, complainant ought to have the opportunity of again presenting its case to the court. To that end we reverse the decree with directions to dismiss the bill without prejudice; and it is so ordered."

Knoxville Water Co. Case

MAYOR AND ALDERMEN OF THE CITY OF KNOXVILLE, APPT., *v.* KNOXVILLE WATER COMPANY.

January 4, 1909. (29 Sup. Ct. Rep. 148.)

Syllabus.

COURTS — SUPREME COURT — REVIEW OF FACTS — FINDINGS BY MASTER

1. The general rule respecting the conclusiveness of a master's findings of fact when confirmed by the court will not be applied by the Federal Supreme Court on an appeal from a decree enjoining the enforcement of a municipal ordinance fixing maximum water rates, on the ground that the ordinance is invalid under United States Constitution, 14th Amendment, as confiscatory.

WATERS AND WATER COURSES — WATER RATES — REASONABLENESS — VALUATION OF TANGIBLE PROPERTY

2. A deduction for depreciation from age and use must be made from the estimated cost of reproducing a waterworks plant when determining the present value of the tangible property for the purpose of testing the reasonableness of the rates fixed by a municipal ordinance.

WATERS AND WATER COURSES — WATER RATES — REASONABLENESS — VALUATION OF TANGIBLE PROPERTY

3. Capitalization affords no guide to the present value of the tangible property of a waterworks company which is objecting to the rates fixed by municipal ordinance as confiscatory, where substantially all the common and preferred stock was issued under construction contracts entered into with persons who controlled the corporate action, and was greatly in excess of the true value of the property furnished under the contracts.

WATERS AND WATER COURSES — WATER RATES — REASONABLENESS — INCOME

4. The absence of any requirement in a municipal ordinance fixing water rates, that the waterworks company shall continue to

give a discount for prompt payment, must be taken into consideration when determining, for the purpose of testing the reasonableness of such rates, the reduction in the company's income which will be produced by the enforcement of such ordinance.

WATERS AND WATER COURSES — WATER RATES — REASONABLENESS — VALUATION

5. Depreciation represented by the destruction or obsolescence of parts of the original plant and by impairment in value of those parts which remain in existence and continue in use cannot be added to the present value of the surviving parts when determining the value of the tangible property of a waterworks company for the purpose of testing the reasonableness of the rates fixed by municipal ordinance.

WATERS AND WATER COURSES — WATER RATES — REASONABLENESS — INCOME

6. The net income of a waterworks company during the years succeeding the passage of a municipal ordinance fixing maximum water rates, which has never been enforced, should be considered by the courts in determining the reasonableness of such rates.

WATERS AND WATER COURSES — FIXING OF RATES — ENJOINING ENFORCEMENT

7. The courts should not enjoin the enforcement of a municipal ordinance fixing maximum water rates on the ground that such ordinance is invalid under United States Constitution, 14th Amendment, as confiscatory, unless the confiscation is clearly apparent.

[No. 17]

Argued April 28, 1908. Decided January 4, 1909.

Appeal from the Circuit Court of the United States for the Eastern District of Tennessee to review a decree enjoining the enforcement of a municipal ordinance fixing maximum water rates. Reversed and remanded with directions to dismiss the bill without prejudice.

The facts are stated in the opinion.

Messrs. G. W. Pickle, W. R. Turner, W. T. Kennerly and J. Pike Powers, Jr., for appellant.

Messrs. Joshua W. Caldwell, R. E. L. Mountcastle, Charles T. Cates, Jr., and S. G. Shields for appellee.

Mr. Justice Moody delivered the opinion of the court:

This is an appeal by the city of Knoxville from a decree of the circuit court of the United States for the eastern district of Tennessee. The appellee is a public service corporation, chartered for, and engaged in, the business of supplying that city and its inhabitants with water for domestic and other uses. The cause in which the decree was rendered is a suit in equity which was brought by the company on December 7, 1901, against the city to restrain the enforcement of a city ordinance fixing in detail the maximum rates to be charged by the company. This ordinance was enacted on March 30, 1901. The bill contained many allegations, which have become immaterial by the decision of this court in Knoxville Water Co. *v.* Knoxville, 189 U.S. 434, 47 L. ed. 887, 23 Sup. Ct. Rep. 531, in which the validity of the ordinance was sustained, except so far as it might confiscate the property of the company by fixing rates so low as to have that effect. The latter contention alone was left open to the company, and to it the remainder of the bill is mainly directed. The allegations in that regard are, that the rates fixed by the ordinance were so low that they denied to the company a reasonable return upon the property employed in the business, and thereby took it for public use without compensation, in violation of the 14th Amendment to the Constitution of the United States. After answer by the respondent and replication by the complainant the cause was referred to a special master, whose report was confirmed by the court. The master found and reported that the value of the plant and property employed in the business at the date of the passage of the ordinance was $608,427.95; that the gross income from the company's business was $88,481.39, and that the operating expenses were $34,750.91. The figures of income and expense are those of the fiscal year ending March 31, 1901, and the valuation was made as of that date. The master found and reported that the diminution of income which would have resulted from the enforcement of the ordinance during the fiscal year was $17,623.64, and that the gross income would have been reduced thereby to $70,857.75, leaving a net income of $36,106.84. This net income was less than 6 per cent on the valuation. In the opinion of the master, 8 per cent, which included 2 per cent to provide for depreciation, was the minimum net return which the company was entitled to earn. The judge of the circuit court, in his opinion confirming the master's report, adopted the master's valuation of the whole plant and property at $608,427.95 (although he held that it ought to be increased by about $3000), and the master's finding that the gross income was $88,481.39; that the expenses were $34,750.91; that the effect of the reduction made by the ordinance

would be to lessen the gross income by $17,623.64, and that therefore the net income under the ordinance would be $36,106.84, or about $400 less than 6 per cent on the valuation. Upon these assumptions of fact as to its effect the judge regarded the ordinance as confiscatory and issued a permanent injunction against its enforcement.

At the threshold of the consideration of the case the attitude of this court to the facts found below should be defined. Here are findings of fact by a master, confirmed by the court. The company contends that, under these circumstances, the findings are conclusive in this court, unless they are without support in the evidence, or were made under the influence of erroneous views of law. We need not stop to consider what the effect of such findings would be in an ordinary suit in equity. The purpose of this suit is to arrest the operation of a law on the ground that it is void and of no effect. It happens that in this particular case it is not an act of the legislature that is attacked, but an ordinance of a municipality. Nevertheless the function of ratemaking is purely legislative in its character, and this is true, whether it is exercised directly by the legislature itself or by some subordinate or administrative body, to whom the power of fixing rates in detail has been delegated. The completed act derives its authority from the legislature and must be regarded as an exercise of the legislative power. Prentis *v.* Southern R. Co. 211 U.S. 210, ante, 67, 29 Sup. Ct. Rep. 67; Honolulu Rapid Transit & Land Co. *v.* Hawaii, 211 U.S. 282, ante, 55, 29 Sup. Ct. Rep. 55. There can be at this day no doubt, on the one hand, that the courts, on constitutional grounds, may exercise the power of refusing to enforce legislation, nor, on the other hand, that power ought to be exercised only in the clearest cases. The constitutional invalidity should be manifest, and where that invalidity rests upon disputed questions of fact, the invalidating facts must be proved to the satisfaction of the court. In view of the character of the judicial power invoked in such cases it is not tolerable that its exercise should rest securely upon the findings of a master, even though they be confirmed by the trial court. The power is best safeguarded against abuse by preserving to this court complete freedom in dealing with the facts of each case. Nothing less than this is demanded by the respect due from the judicial to the legislative authority. It must not be understood that the findings of a master, confirmed by the trial court, are without weight, or that they will not, as a practical question, sometimes be regarded as conclusive. All that is intended to be said is, that in cases of this character this court will not fetter its discretion or judgment by any artificial rules as to the weight of the master's findings, however useful and well settled these rules may be in ordinary litigation. We approach the discussion of the facts in this spirit.

The first fact essential to the conclusion of the court below is the valuation of the property devoted to the public uses, upon which the

company is entitled to earn a return. That valuation ($608,000) must now be considered. It was made up by adding to the appraisement, in minute detail of all the tangible property, the sum of $10,000 for "organization, promotion, etc.," and $60,000 for "going concern." The latter sum we understand to be an expression of the added value of the plant as a whole over the sum of the values of its component parts, which is attached to it because it is in active and successful operation and earning a return. We express no opinion as to the propriety of including these two items in the valuation of the plant, for the purpose for which it is valued in this case, but leave that question to be considered when it necessarily arises. We assume without deciding, that these items were properly added in this case. The value of the tangible property found by the master is, of course, $608,000 lessened by $70,000, the value attributed to the intangible property, making $538,000. This valuation was determined by the master by ascertaining what it would cost, at the date of the ordinance, to reproduce the existing plant as a new plant. The cost of reproduction is one way of ascertaining the present value of a plant like that of a water company, but that test would lead to obviously incorrect results if the cost of reproduction is not diminished by the depreciation which has come from age and use. The company contends that the master, in fixing upon the valuation of the tangible property, did make an allowance for depreciation, but we are unable to agree to this. The master nowhere says that he made allowance for depreciation, and the language of his report is inconsistent with such a reduction. The figures which he adopts are those of a "fair contractor's price." The basis of his calculation was the testimony of an opinion witness called by the company. That witness submitted a table which avowedly showed the cost of reproduction, without allowance for depreciation. The values testified to by him were adopted by the master in the great majority of cases. The witness's valuation of the tangible property was somewhat reduced by the master, but the reductions were not based upon the theory of depreciation, but upon a difference of opinion as to the reproduction cost.

The cost of reproduction is not always a fair measure of the present value of a plant which has been in use for many years. The items composing the plant depreciate in value from year to year in a varying degree. Some pieces of property, like real estate for instance, depreciate not at all, and sometimes, on the other hand, appreciate in value. But the reservoirs, the mains, the service pipes, structures upon real estate, standpipes, pumps, boilers, meters, tools and appliances of every kind begin to depreciate with more or less rapidity from the moment of their first use. It is not easy to fix at any given time the amount of depreciation of a plant whose component parts are of different ages, with different expectations of life. But it is clear that some substantial

allowance for depreciation ought to have been made in this case. The officers of the company, *alio intuitu*, estimated what they called "incomplete depreciation" of this plant (which we understand to be the depreciation of the surviving parts of it still in use) at $77,000, which is 14 per cent of the master's appraisement of the tangible property. A witness called by the city placed the reproduction value of the tangible property at $363,000, and estimated the allowance that should be made for depreciation at $118,000, or 32 per cent. In the view we take of the case it is not necessary that we should undertake the difficult task of determining exactly how much the master's valuation of the tangible property ought to have been diminished by the depreciation which that property had undergone. It is enough to say that there should have been a considerable diminution, sufficient, at least, to raise the net income found by the court above 6 per cent upon the whole valuation thus diminished. If, for instance, the master's valuation should be diminished by $50,000, allowed for depreciation, the net earnings found by him would show a return of substantially 6.5 per cent.

Counsel for the company urge rather faintly that the capitalization of the company ought to have some influence in the case in determining the valuation of the property. It is a sufficient answer to this contention that the capitalization is shown to be considerably in excess of any valuation testified to by any witness, or which can be arrived at by any process of reasoning. The cause for the large variation between the real value of the property and the capitalization in bonds and preferred and common stock is apparent from the testimony. All, or substantially all, the preferred and common stock was issued to contractors for the construction of the plant, and the nominal amount of the stock issued was greatly in excess of the true value of the property furnished by the contracts. A single instance taken from the testimony will illustrate this. At the very start of the enterprise a contract was entered into for the construction of a part of the plant, which was of a value slightly, if at all, exceeding $125,000. The price paid the contractor was $125,000 in bonds and $200,000 in common stock. Other contracts for construction showed a like disproportion between value furnished and nominal capitalization received for that value. It perhaps is unnecessary to say that such contracts were made by the company with persons who, at the time, by stock ownership, controlled its action. Bonds and preferred and common stock issued under such conditions afford neither measure of, nor guide to, the value of the property.

We think that the master and the court erred in another respect, which might affect in an important way the amount which could have been realized under the operation of the ordinance. This error consisted in the manner of deducting the reductions necessarily made by the ordinance. The evidence in the record is not entirely clear, though after careful consideration, we think it shows the following state of

facts: The company's schedule prescribed certain rates, which we may call the book rates, but upon a large part of them a discount of 5 per cent was made if they were promptly paid. The consumers very generally availed themselves of this discount. The discount rates constituted the actual collections, and may be called the actual rates. For the fiscal year which was examined the book rates amounted, in round numbers, to $93,000, while the actual rates amounted, as the master found, to $88,000. The percentage of reduction made by the ordinance was computed to be 22.88. This percentage was ascertained either by comparing the book rates with the ordinance rates, or by comparing the actual rates with the ordinance rates, still further reduced by a 5 per cent discount for prompt payment, which comes to substantially the same result. The fallacy in the process employed by the master consisted in substance in assuming that the ordinance rates would be subject to a discount for prompt payment. The company, it is true, might, if it chose, allow such a discount from the ordinance rates, but the ordinance required no discount from the rates established by it, and the company, therefore, was bound to offer none. If it stood upon the letter of the ordinance, as it had the right to do, and exacted from the consumers the full charges prescribed by the ordinance, the amount which would have been realized would have been over $4000 more than that found by the master, or a net income of not less than $40,000. Doubtless, the abandonment of the common method of discount for prompt payment would deprive the company of an efficient aid to the quick collection of its bills, but, in the case of a prime necessity like water, there are other methods of enforcing prompt payment, though it is not unlikely that the elimination of the discount rate would add somewhat to the cost of collection, and thereby to the operating expenses.

A brief recently filed by the city, to which no reply has been made, seems to show conclusively that there was still another error in ascertaining the amount of reduction effected by the ordinance. What was actually done was to deduct the 22.88 reduction from the actual water rates (excluding hydrant rentals, which were not changed); but, of these actual water rates, $10,000 came from territory outside of the corporate limits, which was not affected by the ordinance. From this $10,000 no percentage should have been deducted. The reduction, therefore, was too large by over $2000. If this correction should be made, it would amount to nearly four tenths of one per cent on the capitalization.

We are also of opinion that the master and the court erroneously excluded evidence which had an important bearing upon the true earning capacity of the company under the ordinance. A clear appreciation of this error can be best obtained by a comprehensive review of the hearing. The company's original case was based upon an elaborate analysis of the cost of construction. To arrive at

the present value of the plant large deductions were made on account of the depreciation. This depreciation was divided into complete depreciation and incomplete depreciation. The complete depreciation represented that part of the original plant which, through destruction or obsolescence, had actually perished as useful property. The incomplete depreciation represented the impairment in value of the parts of the plant which remained in existence and were continued in use. It was urgently contended that, in fixing upon the value of the plant upon which the company was entitled to earn a reasonable return, the amounts of complete and incomplete depreciation should be added to the present value of the surviving parts. The court refused to approve this method, and we think properly refused. A water plant, with all its additions, begins to depreciate in value from the moment of its use. Before coming to the question of profit at all the company is entitled to earn a sufficient sum annually to provide not only for current repairs, but for making good the depreciation and replacing the parts of the property when they come to the end of their life. The company is not bound to see its property gradually waste, without making provision out of earnings for its replacement. It is entitled to see that from earnings the value of the property invested is kept unimpaired, so that, at the end of any given term of years, the original investment remains as it was at the beginning. It is not only the right of the company to make such a provision, but it is its duty to its bond- and stockholders, and, in the case of a public service corporation, at least, its plain duty to the public. If a different course were pursued, the only method of providing for replacement of property which has ceased to be useful would be the investment of new capital and the issue of new bonds or stocks. This course would lead to a constantly increasing variance between present value and bond and stock capitalization, — a tendency which would inevitably lead to disaster either to the stockholders or to the public, or both. If, however, a company fails to perform this plain duty and to exact sufficient returns to keep the investment unimpaired, whether this is the result of unwarranted dividends upon over issues of securities, or of omission to exact proper prices for the output, the fault is its own. When, therefore, a public regulation of its prices comes under question, the true value of the property then employed for the purpose of earning a return cannot be enhanced by a consideration of the errors in management which have been committed in the past.

After the company had closed its case the city undertook to determine the present value of the company's property by the plain method of ascertaining the cost of reproduction, diminished by depreciation. In its case in rebuttal the company followed the same method, though the results differed largely, and, as we have seen, no proper allowance for depreciation was made. In the course of presenting its case the city

offered evidence of the net income of some years subsequent to the passage of the ordinance. The case is peculiar. The company has never observed the ordinance. The suit was begun nine months after its enactment and tried considerably later. In the meantime the company's gross income had largely increased. But the decision in the court below was based solely on the operations of the fiscal year ending March 31, 1901, and the amount of net income ascertained, namely, $36,000 was obtained by applying the reductions made by the ordinance to the operations of that fiscal year. We think it was error to confine the investigation to, and base the judgment upon, that year alone. The precise subject of inquiry was, what would be the effect of the ordinance in the future. The operations of the preceding fiscal year, or of any other past fiscal year, were valueless if the year was abnormal, and were only of significance so far as they foretold the future. If, as in this case, sufficient time has passed, so that certainty instead of prophecy can be obtained, the certainty would be preferable to the prophecy. In this case there would be no absolute certainty, because the ordinance had never been put in operation. But evidence of the operations of the years succeeding to the ordinance is relevant and of great importance, and by a consideration of such evidence a much greater degree of certainty could be obtained. Suppose, by way of illustration, that before bringing suit the company had put the ordinance into effect and had observed it for a number of years, and the result showed that a sufficient net income had been realized, — is it possible that a suit then could be brought and the evidence confined to a period prior to the ordinance, and, by a process of speculation, the conclusion reached that the ordinance would be confiscatory? Some evidence regarding the income of the company after the passage of the ordinance is in the record, but it subsequently was excluded from consideration. It showed an increase of gross and net earnings, but also an increase in the property devoted to the public use. We are unable to say what the effect of the evidence excluded would be; all we can say is, that the inquiry was unduly limited by the exclusion of the evidence of the operation of subsequent years.

It follows from what has been said that the judgment of the court below cannot stand. There was error in the appraisement of the present value of the plant, in the deduction of the reductions made by the ordinance, and in the exclusion of evidence relating to the operations of the company after the enactment of the ordinance.

In ordinary cases full justice would be done by reversing the decree and remanding the cause for further proceedings in the court below, there to undergo a new and doubtless prolonged investigation. It is more than seven years since the enactment of the ordinance, and it has never been observed in any respect. This litigation ought now to be ended, if it is possible to end it with due regard to the rights of

the contending parties. Disregarding for the moment all the errors which were committed in the court below, the decision of this cause may be rested upon a broader ground, which is clearly indicated by the previous judgments of this court. The jurisdiction which is invoked here ought, as has been said, to be exercised only in the clearest cases. If a company of this kind chooses to decline to observe an ordinance of this nature, and prefers rather to go into court with the claim that the ordinance is unconstitutional, it must be prepared to show to the satisfaction of the court that the ordinance would necessarily be so confiscatory in its effect as to violate the Constitution of the United States. In Ex parte Young, 209 U.S. 123, 52 L. ed. 714, 13 L. R. A. (N.S.) 932, 28 Sup. Ct. Rep. 441, the last word of caution by this court was said (p. 166): "Finally, it is objected that the necessary result of upholding this suit in the circuit court will be to draw to the lower Federal courts a great flood of litigation of this character, where one Federal judge would have it in his power to enjoin proceedings by state officials to enforce the legislative acts of the state, either by criminal or civil actions. To this it may be answered, in the first place, that no injunction ought to be granted unless in a case reasonably free from doubt. We think such rule is, and will be, followed by all the judges of the Federal courts." The same thought, in effect, was expressed in San Diego Land & Town Co. *v.* National City, 174 U.S. 739, 754, 43 L. ed. 1154, 1160, 19 Sup. Ct. Rep. 804, 810: "Judicial interference should never occur unless the case presents, clearly and beyond all doubt, such a flagrant attack upon the rights of property under the guise of regulations as to compel the court to say that the rates prescribed will necessarily have the effect to deny just compensation for private property taken for the public use." And in San Diego Land & Town Co. *v.* Jasper, 189 U.S. 439, 47 L. ed. 892, 23 Sup. Ct. Rep. 571, after repeating with approval this language, it was said (p. 441): "In a case like this we do not feel bound to reëxamine and weigh all the evidence, although we have done so, or to proceed according to our independent opinion as to what were proper rates. It is enough if we cannot say that it was impossible for a fair-minded board to come to the result which was reached."

It cannot be doubted that, in a clear case of confiscation, it is the right and duty of the court to annul the law. Thus, in Reagan *v.* Farmers' Loan & T. Co. 154 U.S. 362, 38 L. ed. 1014, 4 Inters. Com. Rep. 560, 14 Sup. Ct. Rep. 1047, where the property was worth more than its capitalization, and, upon the admitted facts, the rates prescribed would not pay one half the interest on the bonded debt; in Covington & L. Turnp. Road Co. *v.* Sandford, 164 U.S. 578, 41 L. ed. 560, 17 Sup. Ct. Rep. 198, where the rates prescribed would not even pay operating expenses; in Smyth *v.* Ames, 169 U.S. 466, 42 L. ed. 819, 18 Sup. Ct. Rep. 418, where the rates prescribed left substantially nothing over operating

expenses and cost of service; and in Ex parte Young, supra, where, on the aspect of the case which was before the court, it was not disputed that the rates prescribed were in fact confiscatory, injunctions were severally sustained. But the case before us is not a case of this kind. Upon any aspect of the evidence the company is certain to obtain a substantial net revenue under the operation of the ordinance. The net income, in any event, would be substantially 6 per cent, or 4 per cent after an allowance of 2 per cent for depreciation. See Stanislaus County *v.* San Joaquin & K. River Canal & Irrig. Co., 192 U.S. 201, 48 L. ed. 406, 24 Sup. Ct. Rep. 241. We cannot know clearly that the revenue would not much exceed that return. We do not feel called upon to determine whether a demonstrated reduction of income to that point would or would not amount to confiscation. Where the case rests, as it does here, not upon observation of the actual operation under the ordinance, but upon speculations as to its effect, based upon the operations of a prior fiscal year, we will not guess whether the substantial return certain to be earned would lack something of the return which would save the effect of the ordinance from confiscation. It is enough that the whole case leaves us in grave doubt. The valuation of the property was an estimate and is greatly disputed. The expense account was not agreed upon. The ordinance had not actually been put into operation; the inferences were based upon the operations of the preceding year; and the conclusion of the court below rested upon that most unsatisfactory evidence, the testimony of expert witnesses employed by the parties. The city authorities acted in good faith, and they tried, without success, to obtain from the company a statement of its property, capitalization, and earnings.

The courts, in clear cases, ought not to hesitate to arrest the operation of a confiscatory law, but they ought to refrain from interfering in cases of any other kind. Regulation of public service corporations, which perform their duties under conditions of necessary monopoly, will occur with greater and greater frequency as time goes on. It is a delicate and dangerous function, and ought to be exercised with a keen sense of justice on the part of the regulating body, met by a frank disclosure on the part of the company to be regulated. The courts ought not to bear the whole burden of saving property from confiscation, though they will not be found wanting where the proof is clear. The legislatures and subordinate bodies, to whom the legislative power has been delegated, ought to do their part. Our social system rests largely upon the sanctity of private property; and that state or community which seeks to invade it will soon discover the error in the disaster which follows. The slight gain to the consumer, which he would obtain from a reduction in the rates charged by public service corporations, is as nothing compared with his share in the ruin which would be brought about by denying to private property its just reward, thus unsettling values and

destroying confidence. On the other hand, the companies to be regulated will find it to their lasting interest to furnish freely the information upon which a just regulation can be based.

If hereafter it shall appear, under the actual operation of the ordinance, that the returns allowed by it operate as a confiscation of property, nothing in this judgment will prevent another application to the courts of the United States or to the courts of the state of Tennessee. But, as the case now stands, there is no such certainty that the rates prescribed will necessarily have the effect of denying to the company such a return as would avoid confiscation. For these reasons —

The decree is reversed and the case remanded to the court below with directions to dismiss the bill without prejudice.

Kansas City, Waterworks Case

NATIONAL WATERWORKS CO. *v.* KANSAS CITY; KANSAS CITY *v.* NATIONAL WATERWORKS CO.

(Circuit Court of Appeals, Eighth Circuit. July 2, 1894.)

Nos. 469, 470. (62 Fed. Rep. 853.)

MUNICIPAL CORPORATIONS — CONTRACTS — MANDATORY STATUTE — PURCHASE OF WORKS OF WATER COMPANY

1. An act empowering a city to grant by ordinance the right to erect and operate waterworks for the use of the city, for a period of 20 years, and to renew the grant for another such term, reserving the right to acquire the works (Act Mo. March 24, 1873), provided that at the expiration of the 20 years, if the grant should not be renewed, the city should purchase the works, and, if the price could not be fixed by agreement, pay therefor the fair and equitable value. The ordinance passed by the city pursuant to the act, and in effect the contract under which the works were erected by a water company, provided that on a failure to renew the grant at the expiration of 20 years the city should then be required to purchase the works. *Held*, that the provision for purchase was mandatory, vital, and controlling, and, on the expiration of the 20 years without renewal of the grant, pending a suit by the company against the city for performance of the contract, compelled a decree therein that the company should sell and the city buy.

SAME — SPECIFIC PERFORMANCE — DECREE RESPONSIVE TO ALLEGATIONS AND PRAYER

2. The bill in such suit, filed by the company nearly 2 years before expiration of the 20 years, alleged performance on the part of the company of the terms of the contract, and a threatened violation of its obligations on the part of the city, and prayed a decree that the contract was binding on both parties, and that the city should perform it, so far as executory and unperformed. *Held*, that after the obligation of the city to purchase had arisen, on the expiration of the 20 years, this was sufficient foundation

to decree completion of the sale and purchase, although the cross bill of the city, and amendments thereto, were inharmonious, and, if the only affirmative pleadings, might not have sustained such a decree, and although the company preferred not to sell, but to continue the franchise, it being then too late for the company to oppose such decree as not responsive to the pleadings.

Same — Incapacity to take Title

3. The company could not object to such decree that the city, by amendments to its charter and acts of the legislature subsequent to the contract, had become disabled to take title to all the property making up the waterworks system, as, if the company was paid the fair and equitable value of its property, its rights would cease.

Same — Title to Property on Expiration of Franchise

4. The act authorizing such grant by the city provided that no grant so made should confer the right to operate the waterworks for any period beyond 20 years, but that it might be renewed for another term. *Held* that, on the expiration of the 20 years without renewal of the grant, the title to the property and the right of possession did not pass to the city without payment, or tender of payment, therefor.

Same — Value of Property after Expiration of Franchise

5. The "fair and equitable value" of the works, to be paid therefor by the city under such act, should not be determined by capitalization of the earnings, — thereby, in effect, valuing the franchise, which no longer existed, — nor should such value be limited to the cost of reproducing the plant, but allowance should be made for the additional value created by the fact of connections with and supply of buildings, although the company did not own the connections.

Same — Damages for Defects in Construction of Works — Estoppel

6. The city's cross bill claimed damages on the ground that the waterworks system did not meet the requirements of the contract in efficiency and completeness. *Held*, that the city, having for many years recognized and accepted the system as constructed in full compliance with the contract, could not maintain this claim.

Appeal from the Circuit Court of the United States for the Western District of Missouri.

This was a suit by the National Waterworks Company of New York against Kansas City, Mo., to enforce a contract for the construction and operation of waterworks for that city. The circuit court rendered a decree for performance of the contract. Both parties appealed.

The contract sought to be enforced was created under an ordinance of the defendant city passed pursuant to provisions of an act of the general assembly of Missouri approved March 24, 1873 (Laws Mo. 1873, p. 286, §§ 1, 22), as follows:

> "Section 1. The city of Kansas is hereby empowered to construct waterworks, to take and convey into and throughout the city, for the use of the same and others therein, water of the Missouri river, Blue river or Kaw river, or all, from any point or points, and to that end to acquire, hold, use, control and dispose of real estate and personal property within and without the corporate limits of the city, and also in the state of Kansas, necessary for laying pipes, constructing reservoirs, aqueducts, appliances and means, and erecting buildings and machinery proper and convenient for such waterworks, and for operating and repairing the same; to receive, take, purify, store, conduct and distribute in and throughout the city such water, and in general to do all things necessary and proper to carry this act into effect and accomplish the object thereof."
>
> "Sec. 22. The city of Kansas is hereby empowered to grant to any person or persons, or any corporation, the right to erect and operate such waterworks as the first section of this act provides for, and to accomplish the purpose therein mentioned on such terms and conditions as may be agreed on in a contract therefor: provided, that such grant shall only be made by or in all respects pursuant to ordinance, which shall not be valid till the same be approved by two thirds of the qualified electors of the city voting on the matter at a general election, or special election ordered and held for the purpose, when the matter of the approval of such ordinance shall be submitted to such electors; the power to order, hold and declare the result of any election requisite being hereby conferred on the city, to be exercised by or pursuant to ordinance; and, provided further, that no grant so made shall confer the right to operate the waterworks for any period beyond twenty years from the time of approval of the ordinance as aforesaid; but the grant may be renewed by or pursuant to ordinance, approved as aforesaid, during the last of such twenty years, for another term not exceeding twenty years, on terms and conditions specified in the ordinance for the renewal of the grant; and, provided further, that in making such

grant or renewing the same, the city shall reserve to itself the right, at its option, and at any time, to acquire and become sole owner of such waterworks, including all extensions and enlargements thereof, and everything of every nature and description belonging and pertaining thereto, on such terms as may be provided and agreed on between the parties at the time the grant is made; or if no right is expressly reserved, or the city cannot, according to any reservation, purchase and become sole owner as aforesaid, then the city may, at any time, at its option, acquire and become sole owner of such waterworks, including all enlargements and extensions thereof, and everything of every nature and description belonging or pertaining thereto, on paying therefor the fair and equitable value thereof, to be ascertained, if the parties cannot agree thereon, by the circuit court of said county, on the petition of the city; the property and subject of purchase to be transferred and belong to the city on payment therefor; and, provided further, that at the expiration of the twenty years, if the grant be not renewed, the city shall purchase and become sole owner of such waterworks as aforesaid, and pay therefor a price agreed upon by the parties or ascertained as they may agree, or, if the price cannot be thus fixed, then the city shall pay the fair and equitable value of the whole works, to be ascertained by said court on the petition of either party filed for the purpose; and, provided further, that the city may furnish any party to whom such grant may be made real estate and right of way for use in constructing and operating such waterworks, according to such agreements as may be made in the premises, and guarantee that the works shall earn a certain amount annually, to be specified in the grant, and guarantee, clear, over and above current expenses, taxes and assessments; and may secure by a proper deed or agreement for the purpose, to the party to whom such grant is made, the control and possession of any real estate and right of any [way] condemned or acquired in the exercise of the right of eminent domain, for use during the time such party may need the same under any such grant."

Under authority granted by this law, the city, by an ordinance approved Oct. 27, 1873, and ratified by a vote of the people on Nov. 15, 1873, and taking effect on the latter date, granted to the National Waterworks Company a right to erect and operate waterworks. The ordinance contained the following provisions:

"Section 1. That the National Waterworks Company of New York, a corporation duly organized under the laws of the state of New York, be and it is hereby authorized, subject to the limitations hereinafter or by law provided, to establish, construct, maintain, and operate waterworks, in or adjacent to the city of Kansas, in the state of Missouri, to receive, take, purify, store, conduct, and distribute in and through-

out the said city of Kansas, pure, well-settled, and wholesome water; to lay down pipes and extend aqueducts and conductors through the streets, avenues, lanes, alleys, or public grounds of the said city of Kansas; to erect and maintain all necessary buildings, machinery, and attachments, of any description, necessary and proper and suitable for such works, and to supply to said city and the inhabitants thereof such water by said waterworks. . . . The rights hereby granted to continue for twenty years from the date of the approval of this ordinance by a vote of the qualified voters of the city of Kansas. . . .

"Sec. 4. The city of Kansas hereby reserves to itself the right at its option, and at any time, to acquire and become sole owner of said waterworks, including all extensions and enlargements thereof and everything of every nature and description belonging and pertaining thereto, on paying therefor the fair and equitable value thereof, to be ascertained, if the parties cannot agree thereon, by the circuit court, or other court of record of the county of Jackson, at Kansas City, upon the petition of the city, and in such manner as the court may determine; provided, that a copy of such petition shall be served upon said company, at least fifteen days before the same shall be presented to said court. If, at the expiration of twenty years from the time this grant shall take effect, the same shall not have been renewed, or the city shall not have become owner of said works, the city shall then be required to purchase and become sole owner of said waterworks as aforesaid, and pay therefor a price agreed upon by the parties, or ascertained as they may agree; or, if the price cannot be thus agreed upon, then the city shall pay the fair and equitable value of the whole works, to be ascertained by said circuit or other court of record as aforesaid, in such manner as said court shall determine on the petition of either party for the purpose; provided, that the party presenting such petition shall have served a copy thereof upon the other party, at least fifteen days before the day of presentation; and, provided also, that if upon examination it be found that such works are not in all respects in good condition, and of first-class and sound materials, and in every way efficient, then the city shall not be required to purchase the same at any time nor at any price."

The company's bill, filed December 26, 1891, recited said act and ordinance, and alleged that under the contract thereby created the company completed the works for operation as required, and that they were duly accepted by the city; that the city adopted another ordinance in February, 1877, whereby certain litigation between it and the company was settled, and certain changes were made in the original ordinance; that on the 25th day of May, 1878, the city, by a certificate signed by its mayor and the presi-

dent of the common council, did certify that said company was operating its works to the satisfaction of the city; that the city adopted another ordinance in August, 1881, whereby the contract was further changed; that the company had kept and performed all the conditions, covenants, premises, and agreements on its part, and that it would at all times be ready, able, and willing to do so; that the company had expended large sums of money in building the works; and that in order to do so it has issued its bonds in the aggregate of $3,000,000, secured by mortgages covering the waterworks plant; that the defendant city, disregarding its duty and obligations to the company under the ordinances aforesaid, and contrary to equity and good conscience, and with the intent and purpose to wreck the company's said waterworks in said city, to destroy the value thereof, and to render valueless to the bondholders of said bonds the security therefor mentioned in the mortgages referred to, and to impair the obligations of said city under said several contracts so entered into by it as aforesaid, and that with this intent and purpose, the said city falsely pretended that the ordinances aforesaid and the contract embodied therein, were not in force, and were no longer binding and obligatory upon said defendant, and particularly that said defendant was not and would not be bound either to purchase said waterworks, as by said ordinance was provided and agreed, or to renew the company's said grant; that the mayor and common council, law officers, and legal advisers of the city had publicly declared and represented that said ordinances and contract were not binding and obligatory upon the city, and had threatened and did threaten and intend to repudiate the same, and refuse to keep and perform the covenants, agreements, and promises therein contained and expressed to be kept and performed on the part of the city with respect to the renewal of said contract, and the purchase of and payment for said waterworks; that in furtherance of said unlawful intent, purpose, and threats, the city had adopted certain charter amendments, and had passed ordinances providing for constructing and operating waterworks in the city, and for issuing bonds for the purpose, and authorizing plans, specifications, and details for the work to be prepared, and had publicly advertised for sealed bids for the purchase of said bonds. The bill prayed a decree "that the several ordinances accepted by your orator, hereinbefore set forth, as they are taken together, are in full force and effect,

and that the contract embodied therein is a valid and subsisting contract, binding and obligatory upon your orator and the defendant, and that the defendant keep and abide by the same; and that, upon your orator's duly and faithfully doing and performing all things yet remaining to be done upon its part, the defendant, its officers and agents, keep and perform the covenants, promises, and agreements on its part, so far as they are executory and unperformed; and that your orator may have such other and further relief as the case may require, and as may be conformable to equity, and to your honors may seem meet, and the defendant, its mayor, common council, officers, and agents, may be perpetually enjoined and restrained by the decree of this court from proceeding to construct and maintain said separate and distinct system of waterworks, and from taking or appropriating to its own use, except under and in pursuance of its contract with your orator, any portion of your orator's said system of waterworks; and that your orator may have such other and further relief as the equity of the case may require, and as to the court may seem meet."

The answer of the city, filed December 6, 1892, admitted the act of the general assembly and the ordinances referred to, the construction and operation of the waterworks by the company, and the fact, as alleged, that the city had availed itself of the rights and privileges stipulated for under the contract, so far as the company had been able to furnish them, but denied that the company had complied with its contract by making a complete and sufficient system of waterworks for the city, as provided for in the ordinance. The answer set up the provision of the contract which required the company, during the year 1874, to construct such a complete and efficient system, and to have and to hold the same, at all times during the period of the franchise, subject to the option and right of the city to purchase and become the sole owner of the works, in the manner therein provided; and alleged a breach on the part of the company of that provision, in that in many respects the company had failed to construct and have the kind of waterworks required by the contract, or to have any complete system of waterworks, specifying various particulars in which the company's system was alleged to be inefficient and incomplete; alleged that by reason of such failure on the company's part the city was relieved from any obligation to purchase the company's system, or any part thereof; and admitted the pur-

pose and intent of the city, in the immediate future, to acquire the ownership and control of a system of waterworks of its own. The company filed a reply specially denying all the substantial allegations of the answer, and alleging the company's readiness and willingness, when required, to convey its complete system of works to the city. The city, also, at the time of filing its answer, December 6, 1892, filed a cross bill which set up the various breaches of the contract on the part of the company alleged in the answer, and alleged that the city had been and was by those breaches released from all obligations to the company; that the company, by its proceeding in this case, and by many other means and practices, was preventing the city from exercising its unquestioned right to provide itself with a new system of waterworks; and that the company had threatened, and was then threatening, to cut off the water supply from the city and its inhabitants, as an illegitimate means of forcing the city to comply with its demands, and to desist from its purpose of building its own waterworks, — and accordingly prayed a decree the opposite of that prayed for by the company, declaring the city released and absolved from all obligations under the contract to purchase its system of waterworks, or any part thereof, and enjoining and restraining the company from interfering in any way with the city's proceedings to sell its bonds and construct its own waterworks, and also for the payment of damages on account of the failure of the company to furnish the degree of fire pressure stipulated for in the contract, which had been paid for for years at the contract rates, and further restraining the company from carrying out its threat of cutting off the water supply pending the suit, and also that a receiver be appointed for the company.

The answer of the company to this cross bill, filed February 28, 1892, contained, in addition to some of the matters stated in its original bill, the same denials and allegations contained in its reply to the answer, and asserted its complete and perfect ownership of its plant, and its ability to convey and deliver the same to the city whenever required, and its readiness to do so on the 15th day of November, 1893, "when the obligation of said city to purchase shall become absolute."

To this answer the city filed a replication.

After the expiration of the franchise, on the 15th day of November, 1893, the city, on the 29th day of November, 1893, filed a supplemental cross bill setting up the expiration of the contract

on the preceding 15th day of November; that the city had not renewed its grant to the company; that no terms of agreement could be entered into between the city and the company with reference to the matter; and that the company had failed to have such works as the city was bound to purchase. It alleged that since November 15, 1893, the time of the expiration of said grant, the company had had no interest in or title to that portion of the plant within the limits of the city, and was wrongfully claiming to own the same, and to use the water mains, pipes, and works for the purpose of furnishing water to private consumers in the city, and had already acted and coerced private consumers into paying water rentals in advance up to the 1st day of April, 1894, and had succeeded in collecting from such private customers an amount of money equal to at least $200,000; that the collection of such rental was to cover the use of water after the expiration of the franchise aforesaid, and that the company proposed to continue in the future to make such exactions from such private consumers without making any allowance to the city for the use of its streets and property; that the city was desirous of having its rights in the premises ascertained and determined; that, if the company had any interest in the pipes and works within the city, the city desired to have such interest ascertained and determined and adjudicated by the court, and that the city be permitted to acquire that interest by the exercise of the right of eminent domain. It further alleged that under the contract the necessary real estate and rights of way for the erection of the works was purchased and had been paid for by the city, but that the company was wrongfully withholding the title to the same from the city, and keeping it in itself, subject to its mortgages; that the city had been largely damaged by the want of the fire pressure guaranteed by the contract, — and asked that those damages might be ascertained and determined. It further alleged great damages by reason of the failure of the company to construct and have for its use, at the termination of the franchise, a complete system of waterworks, and asked damages in that respect. It also alleged the threat of the company to cut off the supply of water to the city for public purposes, and the great danger that would arise in case this threat should be executed, and offered to pay, if required, a reasonable sum for water furnished for public purposes. It therefore prayed a decree declaring that the company's right and title to the works, within

the limits of the city, had expired, and that the same belong to the city; that the court ascertain and determine the interest of the company in the works described by the pleadings, and that the city be permitted to obtain the same upon making just compensation to be determined by the court in such manner as the court may provide; that the company be required to convey the real estate standing in its name to the city; that the damages which the city had suffered by reason of the failure of the company to furnish the required fire pressure in the past be determined and adjudged in favor of the city; that the sum, if anything, which the city ought to pay to the company for furnishing water for public use, pending the litigation, be determined; that the company be enjoined from cutting off the supply of water to the city for public purposes; that if necessary, a receiver be appointed to take and operate the works.

The answer of the company to the supplemental cross bill set up:

"That the said city is without authority or power to purchase said system of waterworks for the following reasons and because of the following facts, to-wit:

> "(*a*) The constitution of the state of Missouri, of 1875, withdrew from said city the power to become indebted to an amount sufficiently large to purchase said system of waterworks, and said city has no means to apply to such purpose, and could only accomplish the same by becoming indebted to an amount which would make its indebtedness exceed the limitations in said constitution contained, and the annual interest on such indebtedness larger than could be paid out of the taxes authorized to be levied for that purpose.
>
> "(*b*) By section 17 of article 13 of the charter of said city, adopted in 1889, it is expressly provided, referring to the contract with this defendant embodied in said Ordinances Nos. 10,524 and 14,776, that 'the city can purchase such works, or renew the franchise thereof only by ordinance passed by a majority vote of the members elect of each house of the common council; and only then in the event that said ordinance shall be approved by a vote of two-thirds of the qualified voters of the city voting at an election held for such purpose.' And the defendant states that no such ordinance has been passed, nor has any election been held, as provided in said charter.
>
> "(*c*) Under Ordinance No. 2,263 of said city, approved August 21, 1890, an amendment to the charter of said city was adopted, the same being mentioned in the seventeenth paragraph of the original bill of complaint, and a copy thereof annexed to said bill as Schedule E;

and in and by such amendment the said city expressly, and for the precise purpose of disabling itself from carrying out its contractual obligations to this defendant, limited its power to hold property for waterworks purposes to such property as might be located in the state of Missouri.

"(*d*) Questions having been made as to the validity of said charter amendments, the complainant caused the general assembly of the state of Missouri to enact 'An act concerning waterworks, and a supply of water for cities now having or that may hereafter have a population of more than one hundred thousand (100,000) and less than three hundred thousand (300,000) inhabitants, whether organized under general law or special charters, or under section sixteen (16) of article nine (9) of the constitution of this state, and to issue bonds for acquiring waterworks, and to make contracts for supplying water to such cities, approved March 6, 1893, which is in substance the same, and contains the same limitations and restrictions upon the powers of the complainant as it imposed upon itself by its charter amendment, namely, to acquire only such property as is situated within the state of Missouri. The complainant is the only city to which said act has or can have application, and the same was caused to be enacted by said complainant for the same purpose which moved the adoption of said charter amendments, as hereinbefore stated.

"(*e*) Under section four of said Contract Ordinance No. 10,524, the said city could only become the owner of said system of waterworks by exercising its option to purchase the same on or before November 15, 1893; and the said city, until long after that date, adhered to the election made and purposes expressed in its original cross bill herein. And the defendant shows that under the charter of said city the authority to act for said complainant in the premises is vested in its common council by the passage of a proper ordinance; that no action whatever has been taken by such body, or by an officer or person authorized to act for said city, relative to the matter; and that the only step taken in the premises has been through the solicitors in this cause, upon their own motion, by the filing of the so-called 'Supplementary Cross Bill' herein.

"(*f*) For more than four years prior to the filing of the said supplementary cross bill, the city has claimed and contended that it was absolved and released from the contract with this defendant, and that it did not propose to, and would not, purchase the defendant's system of waterworks, or any part thereof, although said company has always denied, and does still deny, said claim.

"By reason of which facts this defendant avers that said city is disabled, debarred, and prohibited from purchasing its said system of waterworks, and that said city waived any and all right to do so."

The answer also contained allegations as to the title to the property constituting the company's system, and the company's ability to convey, and denied the allegations of the supplemental cross bill as to insufficiency of the company's system, and damages to the city therefrom.

On the hearing of the cause, on March 22, 1894, the city filed an amendment to its supplementary cross bill, as follows:

> "If, as defendant in its various pleadings avers, it now has such a system of waterworks as by the act of March 24, 1873, and Ordinance 10,524, provided for, then your orator is ready and willing, and now offers, to pay for same a fair and equitable value thereof. Your orator has at all times performed all the duties and obligations on its part, and is ready and willing to abide by and perform all obligations still remaining, if any, including the payment of any money that ought to be paid by virtue of said law and ordinance; but it respectfully shows that, if the court should decree that the contract be specifically enforced, such decree ought to be accompanied with conditions requiring the company to furnish a complete, efficient, and unincumbered supply and distribution system, and requiring the company, until possession is obtained by your orator, to furnish water free of charge, and to account and pay over to your orator all income received since November 15, 1893. Your orator therefore asks the court to ascertain and determine the rights of the parties under and by virtue of the said law and ordinance, and as they existed on and after November 15, 1893, and, when so ascertained and determined, to enforce the same by a proper decree in the premises."

The answer of the company to this amendment was as follows:

> "Answering the amendment made to the supplementary cross bill on March 22, 1894, and numbered paragraph 12 thereof, the defendant says that it is not true that the said Kansas City has at all times, or at any time, performed its duties or obligations in the premises, or that it can or will do so in the future. A distinct breach of duty is the wrongful refusal to pay to this defendant money earned by it under the contract, and adjudged to it by this court. The defendant adopts its answer heretofore filed to the supplementary cross bill as an answer to said amended pleading, and prays as in said answer it has already prayed."

After the testimony in the case was taken, the court appointed two commissioners to make personal inspection of the system of waterworks, and to estimate and fix the value of the works and system as a whole, to be predicated on the actual value of the works, and not upon the stock of the company, and to be the fair

and equitable value of the whole works at the time; to estimate and fix, also, in like manner, the proportionate value of that part of the system lying in the state of Missouri; and to inquire and report on other matters. Upon the pleadings, the evidence in the case, and the report of the commissioners, the cause came on for hearing on March 23, 1894, and on April 20, 1894, a decree was rendered, by which it was ordered, adjudged, and decreed as follows:

"First. That under the act of the legislature and the contract between the National Waterworks Company of New York and the city of Kansas City, set out in the pleadings in this case, the said city is legally bound to purchase from said company, and said company is legally bound to sell to the said city, the full, complete, and entire waterworks plant by which the said city and its inhabitants are now supplied with water, including all portions of said plant, as well that portion in the state of Kansas, and commonly known as the 'Quindaro Supply Works and Flow Pipe' as that portion situated in the state of Missouri, together with all lots and lands belonging to or in any wise used as part of said plant, with the exceptions mentioned in the eleventh paragraph of this decree, and everything of every nature belonging or pertaining to said waterworks plant.

"Second. That said city, under the said contract, is bound to pay for said complete or whole waterworks plant, and the said company is bound to receive in full payment therefor 'the fair and equitable value of the whole works,' as provided in said contract.

"Third. The court finds that the fair and equitable value of the said complete and whole waterworks plant is two million seven hundred and fourteen thousand dollars ($2,714,000).

"Fourth. That said city is entitled to the possession, use, and control of said whole and complete waterworks plant, and said company shall, on the 30th day of April, 1894, surrender and deliver to the said city the said whole and complete waterworks plant, and everything pertaining thereto, and all rights, leases, or contracts relating thereto, and necessary or essential to the full enjoyment of said waterworks as they are now enjoyed and operated by the said company; and the said company is hereby enjoined from using or operating said works, or retaining possession or control of any part thereof, after the said 30th day of April, 1894, and is enjoined from refusing or denying to said city the complete and peaceable possession of said works on that day; and said city is enjoined from refusing or neglecting to demand and accept the possession of said works on that day, and no appeal of this cause by either or both of the parties thereto shall operate to suspend these injunctions.

"Fifth. In the event that said company is unable to deliver the possession of the whole and complete waterworks plant, including the Quindaro Supply Works, then said company shall deliver and the city shall receive on or before said 30th day of April, 1894, that part of the plant in the state of Missouri; and said company is hereby enjoined from interfering with the possession of said city to that part of said works situated in the state of Missouri; and this injunction shall remain in force pending any appeal in this case.

"Sixth. The said company, within six months from the date of this decree, shall make, execute, and deliver to the city a good and sufficient assignment and conveyance of said whole and complete waterworks plant mentioned in the first paragraph of this decree, acceptable to the city or approved by this court, and when such conveyance is accepted by the city, or approved by this court, the city shall become bound to pay to the said company the sum of two million seven hundred and fourteen thousand dollars ($2,714,000), being the fair and equitable value of said works in the manner following, that is to say: The city shall agree and assume to pay on the incumbrances and liens on said waterworks plant, to the holder or holders thereof, as their several rights and interests and priority thereto shall appear, an amount of said lien equal to said sum of two million seven hundred and fourteen thousand dollars ($2,714,000), and shall become bound to save said company harmless as to that amount of said lien. When said sale and transfer of said waterworks plant is made as provided in this paragraph, the liability of the city to pay therefor as herein provided shall relate back to the 30th day of April, 1894.

"Seventh. If the waterworks company shall fail to make and tender a sufficient conveyance of said whole and complete waterworks plant within said six months from the date of this decree, then the city shall not be required to pay the price fixed for the complete and whole plant; and the question whether the city shall pay, or is liable to pay, any sum whatever, for that part or fraction of the plant in Missouri which does not include the source of supply, is reserved.

"Eighth. That said city is not entitled to recover from said company any sum for or on account of any of the several claims for damages set up in its cross bill.

"Ninth. The said city shall pay to said company the contract price for hydrant rentals down to and including the 30th day of April, 1894, amounting, principal and interest, after deducting all payments made thereon, to the sum of one hundred and thirty-nine thousand four hundred and fifty-two dollars and eighty-two cents ($139,452.82), to be paid in the time and manner following, viz.: One-third of said sum shall be paid upon delivery by said company to the city of the possession of the whole and complete waterworks plant as required in the fourth paragraph of this decree, one-third when said company shall

deliver to the city a sufficient conveyance or transfer of the whole and complete waterworks plant, and the remaining third six months thereafter; each of said installments to bear interest at 6 per centum per annum from April 30, 1894.

"Tenth. That said company shall have the right to collect and retain all water rentals which were due prior to the 30th day of April, 1894, and no claim therefor shall be made by the city against the company or the comsumers; and the city shall collect and appropriate to its own use all water rentals which may accrue after the 30th day of April, 1894, and said company shall have no claim against the city or the consumers therefor.

"Eleventh. That, conformably to the consent expressed by counsel for both parties at the hearing, the property described in the pleadings as the 'Kaw Point Pumping Station,' and the six or ten acres of land more or less, connected therewith, and now owned by said company, shall remain its property, and shall not be conveyed to said city as part of said waterworks plant. The value of said Kaw Point pumping station has been deducted from the price to be paid for the complete works.

"Twelfth. That each party shall pay one-half of the costs of these suits.

"Thirteenth. That this case is reserved for the purpose of making such other and further orders as may be found necessary to carry this decree into effect, and as may be equitable and just."

C. O. Tichenor, Gardiner Lathrop, and L. C. Krauthoff, for National Waterworks Company.

Frank Hagerman, John C. Gage, L. C. Slavens, R. W. Quarles, O. H. Dean and F. F. Rozelle for Kansas City, Missouri.

Before Brewer, Circuit Justice, Sanborn, Circuit Judge, and Thayer, District Judge.

Brewer, Circuit Justice, stated the conclusions of the court as follows:

The urgency of the situation seems to forbid that this case should be retained by us for the length of time which would be required for the preparation of an opinion thoroughly and satisfactorily discussing all the difficult questions presented by counsel. All the time at our command we have given to an examination and consideration of the voluminous testimony, the elaborate briefs, and exhaustive arguments of counsel. We feel, therefore, that it is a duty to simply formulate briefly the conclusions to which we have arrived, and announce the decree which must be entered.

1. The act of 1873 provided "that at the expiration of the twenty years, if the grant be not renewed, the city shall purchase." The

ordinance passed in pursuance of that act, and in effect the contract under which the works were created, provided that on a failure to renew the grant at the expiration of 20 years "the city shall then be required to purchase." There has been no renewal of the grant. The twenty years have elapsed. The imperative voice of the act and the ordinance is that the city "shall purchase." This is not an incidental, directory, or subordinate provision, but one mandatory, vital, and controlling. The thought of the legislature was that the city should own its waterworks; that, if any arrangement was made with a corporation for their construction and operation, the control and right of such company should be temporary, and the city should become, willingly or unwillingly, at a certain time the owner. The time fixed was at the expiration of 20 years, with a privilege of extension for another 20 years. This vital, mandatory, and controlling provision compels a decree that the company sell and the city buy. Such was the will of the legislature; such the terms of the act and the ordinance.

2. With reference to the matter of pleading, nearly two years before the expiration of the 20 years the company filed a bill alleging performance on its part of the terms of the contract, and also threatened action on the part of the city in violation of its obligations, and praying a decree that the contract "is a valid and subsisting contract, binding and obligatory upon your orator and the defendant, and that the defendant keep and abide by the same, and that, upon your orator's duly and faithfully doing and performing all things yet remaining to be done upon its part, the defendant, its officers and agents, keep and perform the covenants, promises, and agreements on its part, so far as they are executory and unperformed, and that your orator may have such other and further relief as the case may require, and as may be conformable to equity, and to your honors may seem meet." At that time the obligation of the city to purchase had not yet arrived, but under such a bill a decree, after the lapse of 20 years, and when, there being no renewal of the term, the obligation of the city to purchase has arisen, may properly require the last act of compliance with the terms of that contract, to wit, purchase and payment by the city; so, notwithstanding the fact that the cross bill of the city, and the amendments thereto, may not be altogether harmonious, and might, if they stood as the only affirmative pleadings, be obnoxious to the criticisms of the counsel for the company, yet there is in the original bill, with its prayer, coupled with the changes of right brought by lapse of time, sufficient allegation and prayer upon which to rest a decree for the completion of the sale and purchase. It is true, and indeed confessed in the argument of counsel for the company, that it would now prefer not to sell, but to continue the franchise; but nevertheless, it has for nearly three years placed itself before the court in the attitude

of asking a decree for performance of this contract; and, never having dismissed its bill or withdrawn its prayer, it is now too late to say that the decree for sale and purchase is not responsive to the pleadings. If there were any formal defect, — any omission or addition of statement necessary to distinctly present the issues and uphold the decree, — an amendment would be permissible at the present time, and in the appellate court. Pleadings in equity cases may be conformed to the proofs; and we have the parties before us, the entire facts of the controversy, and the arrival of the time when a final determination of the rights between them is necessary. No technical defect in the pleadings should stay the hands of a court of equity.

3. We dissent in toto from the claim of the city that at the lapse of the 20 years the title to this property, with the right of possession, passed absolutely to it, without any payment or tender of payment, leaving only to the company the right to secure compensation by agreement or litigation, as best it could. Much was said in argument of the relative rights of lessor and lessee to buildings erected during the term of the lease. The city and the company were called licensor and licensee, and it was insisted that, as the right to operate was to cease at the expiration of 20 years, the relation was equivalent to that of lessor and lessee; that full title and right of possession passed instantly to the city, leaving all questions of amount and time and manner of payment to be subsequently determined. Much was said, too, about the rule of construction of public grants; that rule being that the grants are to be construed favorably to the public, and unfavorably to the grantee. It is unnecessary to attempt to define the peculiar quality of the title held by the company, nor do we question the rule of construction of public grants; but all contracts involving property rights and obligations between municipalities and individuals must be presumed to be based upon and to recognize the ordinary laws of business transactions, and, if any departure therefrom is contemplated, such departure must be clearly manifested. Now, the familiar and ordinary law of business transactions is that he who parts with title receives, at the time, payment. In other words, payment of price and transfer of property are contemporaneous and concurrent acts. When it is affirmed that a contract made by a municipality contemplates that he whose money builds and constructs, and therefore establishes title to, property, shall surrender his title and possession without payment, or even the amount thereof determined, the language compelling such a construction must be clear and imperative. There is no such language in either the act or the ordinance. While it is true that the act provides that no grant so made shall confer the right to operate the waterworks for any period beyond 20 years, yet such provision is no more imperative than the one that at the expiration of the 20 years the city shall purchase and pay therefor. If the city fails to purchase and pay,

it acquires no title, no right of possession, to the property of the waterworks. There is no language which would justify the court in saying that it is clearly expressed that the purpose of this contract and the thought of the legislature were to vest the title and right of possession in the city at the end of 20 years, leaving to future litigation the fixing of the amount and the enforcing of the fact of payment. If at the expiration of the 20 years the city had tendered to the company, in payment for the property, an amount admitted or found to be "the fair and equitable value," doubtless the right of the city to the possession and future earnings would have immediately accrued, and the present decree would have been based upon such transfer of right, but no such tender was made. In so far, therefore, as the decree of the circuit court attempted to transfer the title and the possession to the city before payment, we are constrained to hold that it was erroneous.

4. It is objected that the city, by virtue of the certain amendments to its charter and certain acts of the legislature, has become disabled from taking the title to all the property which makes up the waterworks system. This is a matter in respect to which the company need not concern itself. If it is paid the fair and equitable value of the property, as provided by the contract, then its rights have ceased, and the city can settle with other parties the matters of title and possession.

5. The difficult question, however, still remains; and that is, what is "the fair and equitable value" which, by the statute and the ordinance, the city is to pay for the waterworks? This amount was found by the circuit court to be $2,714,000. The company insists that the test is to take the income or earnings, and capitalize them. The earnings pay 6 per cent on four millions and a half. In other words, the company has produced a property which earns 6 per cent on four millions and a half; and that, it is claimed, is the fair valuation of the property, 6 per cent being ordinary interest. On the other hand, the city insists that the franchise has ceased, and that basing the value upon earnings is in effect valuing a franchise which no longer exists, and which the city is not to pay for; that the true way is to take the value of the pipe, the machinery, and real estate, put together into a waterworks system, as a complete structure, irrespective of any franchise, — irrespective of anything which the property earns, or may earn in the future. We are not satisfied that either method, by itself, will show that which, under all the circumstances, can be adjudged "the fair and equitable value." Capitalization of the earnings will not, because that implies a continuance of earnings, and a continuance of earnings rests upon a franchise to operate the waterworks. The original cost of the construction cannot control, for "original cost" and "present value" are not equivalent terms. Nor would the mere cost of reproducing the waterworks plant be a fair test, because that does not take into account

the value which flows from the established connections between the pipes and the buildings of the city. It is obvious that the mere cost of purchasing the land, constructing the buildings, putting in the machinery, and laying the pipes in the streets — in other words, the cost of reproduction — does not give the value of the property as it is to-day. A completed system of waterworks, such as the company has, without a single connection between the pipes in the streets and the buildings of the city, would be a property of much less value than that system connected, as it is, with so many buildings, and earning, in consequence thereof, the money which it does earn. The fact that it is a system in operation, not only with a capacity to supply the city, but actually supplying many buildings in the city, — not only with a capacity to earn, but actually earning, — makes it true that "the fair and equitable value" is something in excess of the cost of reproduction. The fact that the company does not own the connections between the pipes in the streets and the buildings — such connections being the property of the individual property owners — does not militate against the proposition last stated, for who would care to buy, or at least give a large price for, a waterworks system without a single connection between the pipes in the streets and the buildings adjacent. Such a system would be a dead structure, rather than a living and going business. The additional value created by the fact of many connections with buildings, with actual supply and actual earnings, is not represented by the mere cost of making such connections. Such connections are not compulsory, but depend upon the will of the property owners, and are secured only by efforts on the part of the owners of the waterworks, and inducements held out therefor. The city, by this purchase, steps into possession of a waterworks plant, — not merely a completed system for bringing water to the city, and distributing it through pipes placed in the streets, but a system already earning a large income by virtue of having secured connections between the pipes in the streets and a multitude of private buildings. It steps into possession of a property which not only has the ability to earn, but is in fact earning. It should pay therefore not merely the value of a system which might be made to earn, but that of a system which does earn. Our effort has been to deduce from the volume of testimony that which, in this view of the situation, can be safely adjudged "the fair and equitable value." The original cost of the works is not accurately and satisfactorily shown. If it would have assisted us in reaching a conclusion, — if, in consequence of our ignorance thereof, we have not placed the value upon this property which it deserves, — the company is alone to blame, for by the production of its books it could have clearly shown the actual cost of every part and of the whole of this property. There is a large amount of testimony as to the probable cost of reproducing the system, to which strenuous objection is made

on the ground of an alleged temporary and extreme depression in the cost of labor and material. We have before us the estimate placed by two gentlemen of experience and capacity, appointed as commissioners, with direction to report "the fair and equitable value"; but neither by the order of the court, appointing them, nor by their report, are we advised as to what they considered a criterion of the present "fair and equitable value." If they added anything beyond what in their judgment was the reasonable cost of reproduction, we are not advised as to how much they added, or what they took into consideration in making such addition. We have the fact of liens placed upon the property, to the extent of $3,000,000, with the qualified approval of the city officials. We have also the statement of the earnings, and the estimate of the value upon the basis of a capitalization of those earnings, amounting, as stated, at six per cent, to four and one half millions. Rejecting the latter as too high, and the cost of reproduction as too low, and taking into consideration the entire history of the transactions between the company and the city, from its commencement to the present time, we have sought to place a value upon the property as it stands, with all the connections already made between the pipes and the private and public buildings, and with the work which it is in fact doing of supplying all these buildings with water, and receiving pay therefor. That valuation, after much discussion, comparison of figures, and readjustments, we have all agreed, is three million of dollars; and in reaching this result we have excluded from our estimate the value of the Jarboe street reservoir property, which, as we understand the testimony, has heretofore been paid for by the city.

6. In its cross bill the city has made claim for damages, and insisted that the waterworks system does not come up, in efficiency and completeness, to the requirements of the contract. We agree with the circuit court, after reviewing carefully the testimony, that the city is not entitled to maintain this claim. It has for many years recognized and accepted this waterworks system as having been constructed in full compliance with the demands of the contract, and it is now too late to repudiate such recognition.

This is perhaps all that is necessary for us to say. We have stated our conclusions, and outlined our reasons therefor. Further than that we are unable to go, without, as stated in the opening, taking more time than the circumstances will permit. In order to close as far as possible all disputed matters, we have prepared the form of a decree which is to be entered by the circuit court.

This case is accordingly remanded to the circuit court, with directions to vacate its former decree, and in lieu thereof to enter the following decree, to wit:

First. It is ordered, adjudged, decreed, and determined that under the act of the legislature of the state of Missouri of March 24, 1873, and the contract evidenced by Ordinance No. 10,524, between the National Waterworks Company, of New York, and the city of Kansas City, Missouri, which act and ordinance are referred to in the pleadings in this case, the said city is now legally bound to purchase from said company, and said company is legally bound to sell to the said city, the full, complete, and entire waterworks plant and appurtenances by which the said city and its inhabitants are now supplied with water, including therein that portion of said plant situated in the state of Kansas, and commonly known as the "Quindaro Supply Works," and the flow pipes leading therefrom, as well as that portion of said works which is situated in the state of Missouri, together with all lots of land, buildings, and reservoirs belonging to, or in any wise used as a part of, said plant, with the exception mentioned in the eleventh paragraph of this decree, and everything of every nature pertaining to said waterworks plant.

Second. That said city, under the said contract, is bound to pay for said complete waterworks plant aforesaid, and the said company is bound to receive in full payment therefor, "the fair and equitable value of the whole works," as provided in said contract evidenced by Ordinance No. 10,524.

Third. The court finds, adjudges, and decrees, that the fair and equitable value of said complete and whole waterworks plant, excluding the Jarboe street tract, which belongs to the city, is three million dollars, and that said city is legally obligated to pay that sum therefor.

Fourth. That said company is entitled to retain the possession, use, and control of the whole and complete waterworks system and plant aforesaid until final payment therefor shall be made by said city as hereinafter provided; and said city is hereby enjoined from interfering with such possession, use, or control until such payment is made; and said company, on its part, is hereby enjoined from refusing or neglecting to supply water to the city, and from refusing or neglecting to provide private consumers with water, as heretofore during such period.

Fifth. It is further ordered and decreed that on or before the 1st day of December, A.D. 1894, the said company shall cause to be executed, and shall deliver to the clerk of this court, who shall hold the same in escrow, good and sufficient deeds, assignments, releases, bills of sale, and other conveyances whereby the whole and complete waterworks system and plant aforesaid, including that portion thereof which is situated in the state of Kansas, may be transferred to said city free and clear of all burdens, obligations, liens, and incumbrances of every kind, save the lien created by the two mortgages executed by the water-

works company, respectively, on August 1, 1883, and June 1, 1885, each of which mortgages secures bonds of said company, said to be now outstanding in the sum of one million five hundred thousand dollars; that said deeds, releases, assignments, bills of sale, or other conveyances shall be retained by said clerk, but said clerk shall furnish full and complete copies of all such instruments to the city or its attorneys of record, for their inspection.

Sixth. It is further ordered and adjudged that after the execution and delivery to the clerk of the deeds, assignments, releases, and bills of sale aforesaid, the said city shall be entitled to thirty days in which to except to the sufficiency of such conveyances; and power is hereby reserved to hear and determine such exceptions, and to make all needful orders in relation thereto. When such deeds, assignments, releases, and bills of sale shall have been executed and filed as aforesaid, and after the approval thereof by the court, if the same shall be excepted to by the city, said city shall thereupon pay to the clerk of this court the said sum of three million dollars, being the fair and equitable value of said waterworks plant as heretofore assessed, or it shall cause the same to be so paid. Said payment shall be made to said clerk for the benefit of whom it may concern, and power is hereby reserved to the court to determine who are entitled to said fund after the same shall have been so paid into the court; and power is also reserved to permit any person or persons or corporation who may hereafter claim to have a legal or equitable lien upon said fund to intervene for the protection of his or their interest.

Seventh. It is further ordered and adjudged that upon payment being made by said city as aforesaid of said sum of three million dollars, and of the hydrant rentals mentioned in paragraph nine, said clerk shall deliver to said city or its authorized representatives all deeds, assignments, releases, bills of sale, and other muniments of title then held by him in escrow; and thereupon said city shall become vested with the title to said waterworks, and it shall forthwith be entitled to the exclusive possession, control, use, and enjoyment of said entire waterworks system and plant, and to all revenues, of whatsoever nature, thereafter resulting therefrom; and said waterworks company shall forthwith surrender the possession and control thereof to said city, and the interest of said company therein shall thenceforth cease and determine.

Eighth. It is further ordered, adjudged, and decreed that said city shall have the right to enter into any agreement which it may deem proper for the assumption, continuation of the lien, payment, or cancellation of any of the outstanding mortgage bonds, aggregating three million dollars, which are referred to in paragraph five of this decree, and that any arrangement which said city may so enter into with the owners and holders of said bonds, which shall result in the cancellation

or payment of any thereof, or in the continuation of the lien, or in the assumption of any thereof by the city, and in the release of the water-works company from its obligations thereon, shall operate *pro tanto* to discharge said city from its obligation to pay the three million dollars as provided in the sixth paragraph of this decree; and, for the purpose of enabling said city to avail itself of the provisions of this paragraph of the decree, power is hereby reserved to the court to ascertain hereafter to what extent, if any, said bonds have been canceled, paid, continued, assumed, or otherwise discharged by agreement between said bondholders and the city, and to make all needful orders in that behalf.

Ninth. It is further ordered, adjudged, and decreed that in addition to the value of said waterworks plant, fixed and to be paid as aforesaid, the said city shall also pay all unpaid hydrant rentals which accrued prior to November 15, 1893, and all subsequently accruing hydrant rentals, according to the rate heretofore fixed by agreement between said city and company until such time as the said city shall become entitled to the possession and use of said waterworks by virtue of compliance on its part with the previous provisions of this decree. Until the last-mentioned date, said waterworks company shall be entitled to all the earnings and revenues of said plant, whether derived from individual or public consumers; but said company, on its part, shall be compelled, during said period, to keep said waterworks plant in good repair, and shall also pay, as and when the same shall mature, the several interest installments that may accrue on the mortgage bonds mentioned in paragraph five of this decree. Said payment of hydrant rentals, as well as the assessed value of the works, shall be made before said city shall assume possession and control of said waterworks; and power is hereby reserved to the court to hereafter state an account, if necessary, for the sum due for hydrant rentals, and to make all needful orders necessary and proper to enforce this paragraph of the decree.

Tenth. It is further ordered, adjudged, and decreed that the city is not entitled to recover from said company any sum for or on account of any of the several claims for damages set up in its cross bill, and as to said claims for damages said cross bill is hereby dismissed.

Eleventh. That, conformably to the consent expressed by counsel for both parties at the hearing, the property described in the pleadings at "Kaw Point Pumping Station," and the six or ten acres of land, more or less, connected therewith, now owned by said company, shall remain its property, and shall not be conveyed to said city as part of said water-works plant. The value of said Kaw Point pumping station has been deducted from the price to be paid for the complete works.

Twelfth. It is further adjudged that each party shall pay one half of the costs that have accrued in these suits up to the entry of this decree.

Thirteenth. That the court doth now reserve to itself the power to make any further order or orders that may hereafter be found necessary to carry this decree into full effect, and as may be deemed equitable and just.

Kennebec Water District Case

KENNEBEC WATER DISTRICT *v.* CITY OF WATERVILLE, ET AL. Report from supreme judicial court of Maine, Kennebec County.

Action by the Kennebec water district against the city of Waterville and others. Case reported. Instructions to appraisers given.

On report. Instructions to appraisers given by the court to determine the valuation of property of the Maine Water Company, and acquired by the plaintiff by the exercise of the right of eminent domain. Dec. 27, 1902.

WATER COMPANY — EMINENT DOMAIN — INSTRUCTIONS TO APPRAISERS—FRANCHISE—VALUATION—DAMAGES—EVIDENCE

An act incorporating the plaintiff district authorized it to acquire, by the exercise of the right of eminent domain, "the entire plant, property and franchises, rights and privileges now held by the Maine Water Company within said district and the towns of Benton and Winslow." The act further provides that appraisers appointed by the court, "shall, upon hearing, fix the valuation of said plant, property and franchises at what they are fairly and equitably worth, so that said Maine Water Company shall receive just compensation for all the same," but that, "before a commission is issued to the appraisers, either party may ask for instructions to the appraisers." Both parties having asked for instructions, and the questions of law arising thereon having been reported to the law court, the court is of opinion that the appraisers should be instructed in accordance with the following principles:

Instructions.

1. The plaintiff, if it takes anything, must take all the property held by the Maine Water Company in the Kennebec water district and in Benton and Winslow, whether specifically named in the act or not. This includes the real estate or other property, if any, not connected with the water system; it includes the plant or physical system; and it includes all franchises, rights, and privileges held by the water company, exercised or capable of being exercised.

2. The Maine Water Company is a quasi public, or public service,

corporation, and is entitled to charge reasonable rates for its services, and no more.

3. The basis of all calculation as to the reasonableness of rates to be charged by a public service corporation is the fair value of the property used by it for the convenience of the public.

4. At the same time, the public have the right to demand that the rates shall be no higher than the services are worth to them, not in the aggregate, but as individuals.

5. Summarized, these elemental principles are the right of the company to derive a fair income, based upon the fair value of the property at the time it is being used for the public, taking into account the cost of maintenance or depreciation, and current operating expenses, and the right of the public to have no more exacted than the services in themselves are worth.

6. The reasonableness of the rate may also be affected, for a time, by the degree of hazard to which the original enterprise was naturally subjected; that is, such hazard only as may have been justly contemplated by those who made the original investment, but not unforeseen or emergent risks. And such allowance may be made as is demanded by an ample and fair public policy. If allowance be sought on account of this element, it would be permissible at the same time to inquire to what extent the company has already received income at rates in excess of what would otherwise be reasonable, and this has already received compensation for this hazard.

7. The franchises granted to the Waterville Water Company by chapter 141, Priv. & Sp. Laws 1881, as amended by chapter 59, Priv. & Sp. Laws 1887, and chapter 14, Priv. & Sp. Laws 1891, and to the Maine Water Company by chapter 352, Priv. & Sp. Laws 1893, are not exclusive. Neither are they perpetual and irrevocable. They are subject to legislative repeal. In fixing the value of the franchises, both of these considerations are entitled to their just weight. If the business of the company is now practically exclusive, in that it has no competitor, that fact, also, may and should be considered by the appraisers when they fix the value of the property of the company as a going concern.

8. In determining the present value of the company's plant, the actual construction cost thereof, with proper allowances for depreciation, is legal and competent evidence, but it is not conclusive or controlling.

9. The request that "under no circumstances can the value of the plant be held to exceed the cost of producing at the present time a plant of equal capacity and modern design" should not be given. Among other things, it leaves out of account the fact that it is the plant of a going concern, and seeks to substitute one of the elements of value for the measure of value itself.

10. The actual rates which may have been charged heretofore, and the actual earnings, are both admissible and material in determining

the value of the plant. The value of the evidence, however, will depend upon whether the appraisers shall find that the rates charged have been reasonable.

11. The quality of water furnished and of the service rendered, and the fitness of the plant and of the source of water supply to meet reasonable requirements in the present and future, are material upon the question of present value.

12. The appraisers should regard the franchises of the company as entitling it to continue business as a going concern, but subject to all proper legal duties governing public service companies.

13. Faithfulness or unfaithfulness shown by the water company in the past in the performance of public duty to furnish pure water at reasonable rates is not a proper matter for consideration. It is the franchise as it now exists which is to be taken and paid for.

14. The liability of the company to legal forfeiture of its franchises on account of past unfaithfulness and misbehavior is not to be considered.

15. If the water company and its predecessors have actually received more than reasonable rates hitherto, the excess cannot be deducted from the amount to which the company would otherwise be entitled.

16. No compensation can be allowed to the Maine Water Company for incidental damages to its other property having no physical connection with or contiguity to that taken, and having no relations with it except those which grow out of common ownership, nor for the impairment of the economy and efficiency of administration which are obtained by the combination of many water systems under one management.

17. The real estate or other outside property not directly connected with the water system should be appraised at its fair market value, not at forced sale, but at what it is fairly worth to the seller, under considerations permitting a prudent and beneficial sale thereof.

18. The appraisers may properly consider what the existing system can be reproduced for. But the cost of reproduction will not be conclusive. It will be evidence having some tendency to prove present value. The inquiry along the line of reproduction should be limited to the replacing of the present system by one substantially like it.

19. In estimating even the structure value of the plant, allowance should be made for the fact, if proved, that the company's water system is a going concern, with a profitable business established, and with a present income assured and now being earned.

20. So far as the water system is practically exclusive, the element of good will should not be considered.

21. In fixing structure value, while considering the fact that the system is a going concern, the appraisers should also consider, among other things, the present efficiency of the system, the length of time necessary to construct the same *de novo*, and the time and cost needed

after construction to develop such new system to the level of the present one in respect to business and income, and the added net income and profits, if any, which by its acquirement would accrue to a purchaser during the time required for such new construction, and for such development of business and income. But these are to be considered "among other things." They are not controlling. Their weight and value must depend upon the varying circumstances of each particular case.

22. In addition to structure values, the appraisers should allow just compensation for all the franchises, rights, and privileges to be taken.

23. The value of the franchise depends upon its net earning power, present and prospective, developed and capable of development, at reasonable rates; and the value to be assessed is the value to the seller, and not to the buyer.

24. In considering prospective development of the use of a franchise, consideration must also be had of the fact that further investment may be necessary to develop the use, and of the further fact that at any stage of development the owner of the franchise will be entitled to charge only reasonable rates under the conditions then existing.

25. Subject to all the foregoing limitations, the owner is entitled to any appreciation due to natural causes.

26. The fact that the franchises are to be taken in no respect impairs their value for the purposes of appraisal.

27. As to the property to be taken, both plant and franchises are to be appraised, having in view their value as property in itself, and their value as a source of income. There are these elements of value, but only one value of one entire property is to be appraised in the end. These elements necessarily shade into each other.

28. The capitalization of income, even at reasonable rates, cannot be adopted as a sufficient or satisfactory test of present value. But while not a test, present and probable future earnings at reasonable rates are properly to be considered in determining the present value of the system.

29. The appraisers should be instructed to receive and consider all evidence offered, so far as admissible under the general rules of law, which is pertinent under the rules stated in the requests of the parties, so far as they have been approved, and as limited or explained, in the opinion of the court.

(Official.)

Montgomery County *v.* Schuylkill Bridge Co.

Proceedings to declare a bridge across the Schuylkill river belonging to the Schuylkill Bridge Company, a county bridge, the report of viewers to assess damages allowed the company $50,000, from which the company appealed to the court of common pleas of Montgomery County, a change of venue being afterwards taken to Bucks County. Here a verdict and judgment were entered for $111,322.12, and defendant took a writ of error.

(Supreme Court of Pennsylvania. May 25, 1885. 20 Atl. Rep. 407.)

Syllabus.

TOLL BRIDGE — TAKING FOR PUBLIC USE — MEASURE OF DAMAGES

1. Where a private toll bridge is taken for public use, the measure of damages is not alone the cost of a similar bridge, diminished by the wear and tear, but the value of the franchise to take tolls must also be considered.

2. To ascertain the value of the franchise, the receipts of the company in past years may be shown, but it is proper to refuse to extend the inquiry back for more than five years.

3. The value of the tollhouse, and also of a canal bridge used as an approach to the main bridge, may be included as damages.

4. In proceedings to take a private toll bridge for public use, the principle of market value does not apply in determining the measure of damages as the property taken cannot be said to have a market value.

5. In proceedings to take a private toll bridge for public use, evidence that the bridge company had declared larger dividends than allowed by law is immaterial.

San Diego Land and Title Co. *v.* City of National City et al.

No. 25 (May 22, 1899) (19 Sup. Ct. Rep. 804)

WATERS AND WATER COURSES — NOTICE — FIXING RATES — HEARING — CONSTITUTIONAL LAW — REASONABLENESS OF RATES — JUST COMPENSATION — LOSSES

Syllabus.

1. Const. Cal. art. 14, § 1, requiring water rates to be fixed by the legislative bodies of municipalities by ordinance in February and July of each year, and Act Cal. March 7, 1881, § 2, making it the duty of such bodies at least thirty days prior to January 15th of each year to obtain from water companies a detailed statement showing the names of rate payers, the amount paid by each during the preceding year, and all revenue derived from all sources and expenditures for supplying water, dispense with necessity of a formal notice to parties interested as to the day on which the rates are to be fixed.

2. Sufficient provision for a hearing as to the fixing of water rates is made by Act Cal. March 7, 1881, § 2, making it the duty of the legislative bodies of municipalities to require water companies at least thirty days before January 15th of each year to furnish detailed statements showing the names of rate payers, amount paid by each during the preceding year, and all revenue derived from all sources and expenditures for supplying water.

3. Where, prior to the passage of an ordinance fixing water rates by a municipality, the water company, under Act Cal. March 7, 1881, was required to make a detailed statement of its business and financial condition, and the subject of rates was considered in conferences between the local authorities and the officers of the water company, it will be presumed that the case of the water company as to the justice of the rates fixed was fully considered before the ordinance fixing the rate was passed.

4. Courts will not interfere with the collection of rates established under legislative sanction, unless they are so plainly and palpably unreasonable as to make their enforcement equivalent to

the taking of property for public use without such compensation, as, under all the circumstances, is just, both to the owner and the public.

5. A contention that, in ascertaining whether water rates are just, the court should take into consideration the cost of the plant, the cost per annum of operating the plant, including interest on money borrowed, and reasonably necessary to be used in constructing the same, the annual depreciation from use of the plant, and a fair profit over and above such charges for services, is defective in not requiring the real value of the property and the fair value in themselves of the services. Just compensation is a fair return upon the reasonable value of the property at the time it is being used by the public.

6. Losses to a water company arising from the distribution of water to consumers outside of the city are not to be considered by a municipality in fixing the rates of a water company, only a part of whose system is within the municipality.

Appeal from the Circuit Court of the United States for the Southern District of California.

Covington and L. Turnpike Road Co. et al. *v.* Sandford et al.

No. 50. (December 14, 1896.) (17 Sup. Ct. Rep. 198.)

TURNPIKE COMPANIES — EXEMPTION FROM LEGISLATION REDUCING TOLLS — SUFFICIENCY OF PLEADINGS — FEDERAL QUESTION — VALIDITY OF STATUTE REDUCING TOLLS

Syllabus.

1. The fact that a turnpike company, claiming under its charter exemption from legislation reducing its rates of toll below a certain limit, has collected tolls according to reduced rates fixed by a subsequent statute, is not a recognition by the company of the right of the legislature to amend or repeal its charter at will.

2. A statute dividing a turnpike company into two distinct corporations, controlling different portions of the road, and providing that each shall retain "all the powers, rights, and capacities" granted by the charter of the original company, does not pass to the new companies a right of exemption from legislative control of tolls which was reserved to the original company by its charter.

3. A statute making such an unreasonable reduction in the rates of toll charged by a turnpike company as will prevent it, out of its receipts, from maintaining its road in proper condition for public use, or from earning any dividend on its stock, is repugnant to the constitutional provision that no person shall be deprived of property without due process of law.

4. In an action to enjoin a turnpike company from charging tolls in excess of the rates fixed by a certain statute, the company set out in its answer the average annual recepits and expenses for several years prior to the statute, and alleged that its net earnings for those years had not allowed dividends greater than 4 per cent; that the statute in question reduced the rates 50 per cent below those before allowed by law; and that such reduction would so diminish the income of the company that it could not maintain its road, meet ordinary expenses, and earn any dividend whatever. *Held*, that these allegations were sufficient, assuming them to be true, to raise the question whether the statute deprived the defendant of its property without due process of law.

5. Where a party to an action in a state court specially claims a right under the constitution or laws of the United States, the decision of the state court as to the sufficiency of the allegations to present such claim is not conclusive upon the Federal supreme court.

6. A statute reducing the tolls charged by a turnpike company below those prescribed by general statute for other turnpike companies in the state does not necessarily deny to it the equal protection of the laws. The circumstances of each company must determine what rates of toll will give it such compensation for the use of its property as will be just to it and the public.

In Error to the Court of Appeals of the State of Kentucky.

Monongahela Navigation Co. *v.* United States

No. 722. (March 27, 1893.) (13 Sup. Ct. Rep. 622.)

EMINENT DOMAIN — COMPENSATION — CONSTITUTIONAL LAW — FRANCHISES — VESTED RIGHTS

Syllabus.

1. The question as to what is "just compensation" for private property taken for public use is a judicial, and not a legislative, question; and the provision in the act authorizing the condemna-

tion of a lock and dam belonging to the Monongahela Navigation Company (25 St. at Large, p. 411), "that in estimating the sum to be paid by the United States the franchise of said corporation to take tolls shall not be considered or estimated," does not preclude the court from giving compensation for such franchise.

2. The only authority which the United States has to condemn a lock and dam belonging to a corporation chartered by a state is derived from the power to regulate interstate and foreign commerce; and such power must always be subject to the obligation imposed by the fifth amendment to make "just compensation" for private property taken for public use.

3. The power of congress over waterways connected with the great rivers of the country is supreme whenever it chooses to exercise the same, but before it has acted the legislative power of the state within whose borders the stream flows is competent to charter a corporation to improve the same, and to give it a franchise to collect tolls. A franchise thus granted is a vested right, and if congress thereafter, by condemnation, takes such improvements, it is bound to make just compensation for the value of the franchise, as well as for the physical property taken. Bridge Co. *v.* United States, 105 U. S. 470, distinguished.

4. The fact that congress possesses supreme power does not cause a grant of such a franchise by the state to be a mere license which is revoked or annulled when congress, in the subsequent exercise of its power, takes possession of the improvement.

Appeal from and in error to the circuit court of the United States for the western district of Pennsylvania.

Proceedings by the United States to acquire a lock and dam of the Monongahela Navigation Company, situated on the Monongahela river. From the judgment awarding compensation the navigation company appeals. Reversed.

Cotting *v.* Kansas City Stockyards Co. et al. Higginson *v.* Same

(Circuit Court, D. Kansas, First Division. Oct. 28, 1897.)
Nos. 7427 and 7453. (82 Fed Rep. 850.)

Syllabus.

COMMERCE — LEGISLATIVE REGULATIONS — STOCKYARDS

1. A stockyard business, located in a large city, at the junction of many railroad lines, which furnishes the only proper facilities

for the unloading, resting, and feeding of live stock in transit, and for the sale of cattle within said city, is affected with a public use, so as to be subject to legislative control, and the proper legislative body may prescribe a maximum rate of compensation for the care and handling of stock thereat.

Interstate Commerce — Stockyards Business

2. It is doubtful whether the business of a stockyards company, which itself neither buys nor sells live stock, but merely renders services to the owners thereof, in yarding, feeding, watering, and weighing the animals, constitutes interstate commerce, though a large proportion of the animals come to its yards from other states, and are therefore themselves subjects of interstate commerce. The fact that a particular stockyard extends over the boundary line between two states does not make the business there carried on interstate commerce.

Same — Regulation by State

3. Conceding that the business of a stockyards company in handling live stock in transit from other states is so intimately related to interstate commerce which is transacted in its yards by other persons that congress might lawfully prescribe maximum charges for yarding, feeding, and caring for stock coming from other states, yet this power is not of such an exclusive character as to prevent the state from prescribing such rates, in the absence of any legislation on the subject by congress.

Constitutional Law — Due Process and Equal Protection — Confiscation — Fixing Compensation for Services Rendered

4. In determining whether a state statute prescribing rates of charges by a stockyards company is reasonable, or confiscatory, so as to amount to a taking without due process of law, or the denial of the equal protection of the laws, a prime factor is the valuation which shall be placed on the property of the stockyards company used in its business of yarding and feeding stock.

Same

5. When a valuation is placed on property, which has become affected with a public use, for the purpose of ascertaining whether the maximum rate of compensation fixed by law for its use is

reasonable or otherwise, the income derived therefrom by the owner before it was subjected to legislative control cannot always be accepted as a proper test of value, because the charges then made may have been excessive and unreasonable. And, when the property has been capitalized by issuing stock, neither the market value nor the par value of the stock can be accepted in all cases as a proper criterion of value, because the stock may not represent the money actually invested, and because the property may have been capitalized mainly with reference to its income-producing capacity, on the assumption that it was ordinary private property, which the owner may use as he pleases, without being subject to legislative control. On the other hand, the owner is entitled to the benefit of any appreciation in value above original cost resulting from natural causes, such as improvements made in the vicinity, growth of the town, etc.

Same

6. A state statute prescribing maximum charges to be made by a stockyards company, and which allows an income of 5.3 per cent annually on the actual value of the property used for stockyards purposes, or of 4.6 per cent on the capitalized value of the property and business, is not confiscatory, though it reduces the previous net income nearly 50 per cent.

Temporary Injunction — Dismissal of Bill

7. In a suit to enjoin the enforcement of a state statute prescribing maximum charges of a given business, on the ground that it amounts to an unconstitutional confiscation of property, where the questions involved are doubtful, the court, though it decides to dismiss the bill, will grant a temporary injunction pending a probable appeal: it appearing that the enforcement of the statute meantime would produce great harm to the complainant's business.

Smyth, Attorney General, et al. *v.* Ames et al. Same *v.* Smith et al. Same *v.* Higginson et al

Nos. 49–51. (March 7, 1898.) (18 Sup. Ct. Rep. 418.)

FEDERAL JURISDICTION — SUIT AGAINST STATE OFFICERS — CONSTITUTIONAL LAW — DUE PROCESS AND EQUAL PROTECTION — STATE REGULATION OF RAILROAD CHARGES

Syllabus.

1. A suit against individuals for the purpose of preventing them, as officers of a state, from enforcing an unconstitutional statute to the injury of plaintiff's rights, is not a suit against the state, within the meaning of the eleventh amendment to the Federal constitution.

2. A railroad corporation is a person, within the meaning of the fourteenth amendment, declaring that no state shall deprive any person of property without due process of law, nor deny to any person within its jurisdiction the equal protection of the law.

3. A state enactment, or regulations made under authority thereof, establishing rates for the transportation of persons or property by railroad, that will not admit of the carrier earning such compensation as, under all the circumstances, is just to it and to the public, would deprive such carrier of its property without due process of law, and deny to it the equal protection of the laws, and would, therefore, be repugnant to the fourteenth amendment of the Constitution of the United States.

4. While rates for the transportation of persons and property within the limits of a state are primarily for its determination, the question whether they are so unreasonably low as to deprive the carrier of its property without such compensation as the constitution secures, and therefore without due process of law, cannot be so conclusively determined by the legislature of the state, or by regulations adopted under its authority, that the matter may not become the subject of judicial inquiry.

5. While railroads may not discriminate in their charges against the people of any one state, they are not necessarily bound to give absolutely the same rates to the people of all the states; for the kind and amount of business, the cost thereof, the cost of construction and maintenance, are factors which determine largely the question of rates, and these vary materially in different states.

6. When a state undertakes to prescribe maximum rates on

local business done by an interstate carrier, it must do so with reference exclusively to what is just and reasonable as between the carrier and the public in respect of domestic business alone; and interstate business cannot be made to bear losses resulting from the rates prescribed for local business.

7. If a railroad company has bonded its property for an amount that exceeds its fair value, or if its capitalization is largely fictitious, it may not impose upon the public the burden of increased rates, necessary to realize profits on this fictitious capitalization; but the basis of all calculations as to the reasonableness of rates must be the fair value of the property used by the company for the convenience of the public. In ascertaining this value, the original cost of construction, the amount expended in permanent improvements, the amount and market value of its bonds and stock, the present as compared with the original cost of construction, the probable earning capacity of the property under particular rates prescribed by statute, and the sum required to meet operating expenses, are all matters for consideration, and are to be given such weight as may be just and right in each case.

8. The Nebraska law of April 12, 1893, to regulate railroads, classify freights, and fix maximum rates for transportation of freights, is void as to the particular rates prescribed, as depriving the companies of their property without due process of law, and denying them the equal protection of the laws, contrary to the fourteenth amendment to the Federal constitution.

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